DOCUMENT RESUME

ED 394 234 EC 304 754

AUTHOR Kapperman, Gaylen; And Others
TITLE Project CD-VisROM: Remote Access to CD-ROM by Visually Impaired Students.
INSTITUTION Research and Development Inst., Sycamore, IL.
SPONS AGENCY Office of Special Education and Rehabilitative Services (ED), Washington, DC. Div. of Innovation and Development.
PUB DATE 96
CONTRACT H180E20053
NOTE 119p.; This report is accompanied by an explanatory videotape (not available via ERIC) and a 19-page guide paralleling the video. The guide is appended.
PUB TYPE Audiovisual/Non-Print Materials (100) -- Reports - Descriptive (141) -- Guides - Non-Classroom Use (055)

EDRS PRICE MF01/PC05 Plus Postage.
DESCRIPTORS *Access to Information; Assistive Devices (for Disabled); Communication Aids (for Disabled); *Computer Networks; Elementary Secondary Education; *Information Networks; Input Output Devices; *Optical Disks; *Visual Impairments

ABSTRACT

Project CD-VisROM was a 3-year federally supported project to develop procedures by which students who are visually disabled could access the vast amounts of information available through the compact disc read-only-memory (CD-ROM) medium. The heart of the system is a computer which is equipped with several CD-ROM drives, and a CD-ROM in each drive. The second component is the computer which the student uses, equipped with a modem and adaptive software and hardware enabling the visually disabled student to have access to the information displayed on his or her computer screen, such as screen enlargement software, a speech synthesizer, or electronic braille displays. The system also involves one or more communication nodes and software designed to operate the system. A very large number of students who are widely dispersed can make use of the system. The project report offers a description of the system, the basics of CD-ROM technology, assistive technology, training guidelines, ongoing management suggestions, and considerations for establishing remote access to CD-ROM service. Appendices provide workstation instructions, a list of equipment and software, training program components, sample lesson plans, quick reference sheets, and sources of CD-ROMs. A printed guide to the system lists reference materials available on CD-VisROM; system components; benefits of the system for visually impaired students, vision teachers, and school districts; how students access and use the system; and guidelines for setting up a CD-VisROM system. An accompanying video explains how students with visual impairments can do research on their own, and demonstrates students' use of the equipment. It offers the perspectives of students, teachers, an administrator, and a parent concerning the system, and points out that the two main advantages of CD Vis-ROM are that it is cost-effective and user-friendly. (JDD)

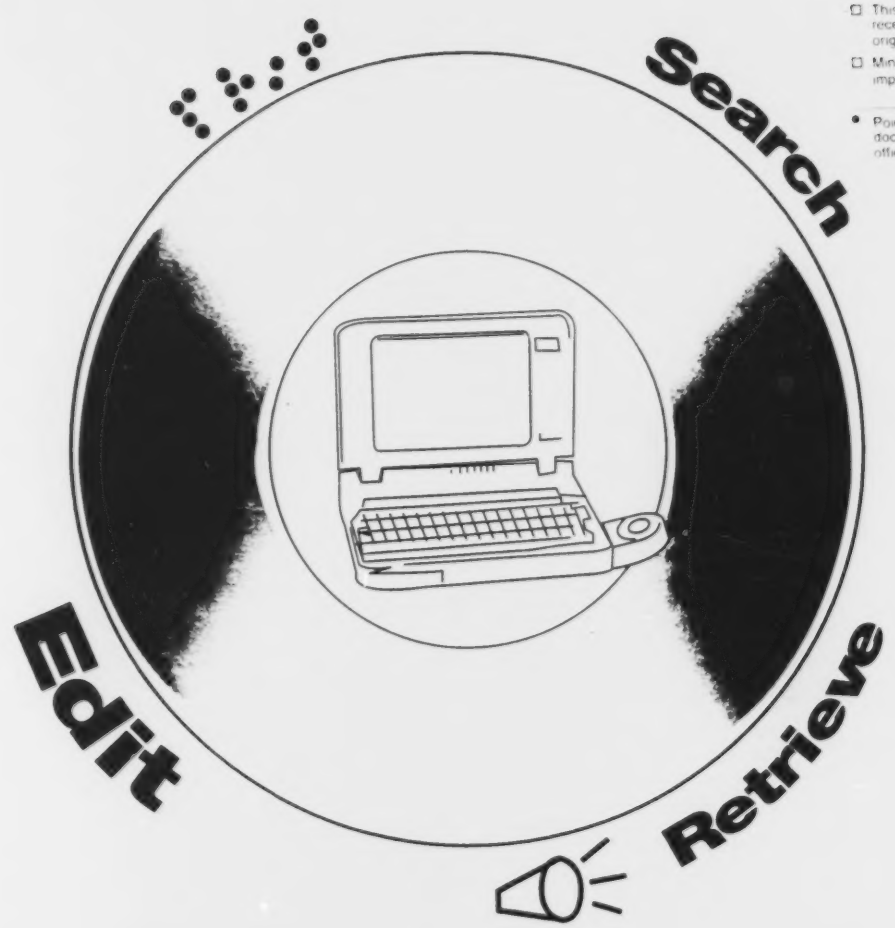
Project CD-VisROM

Remote Access to CD-ROM by Visually Impaired Students

ED 394 234

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

- ☐ This document has been reproduced as received from the person or organization originating it.
- ☐ Minor changes have been made to improve reproduction quality.
- • Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.



Gaylen Kapperman
Steve Hahn

Toni Heinze
Susan Dalton

Research & Development Institute
1996

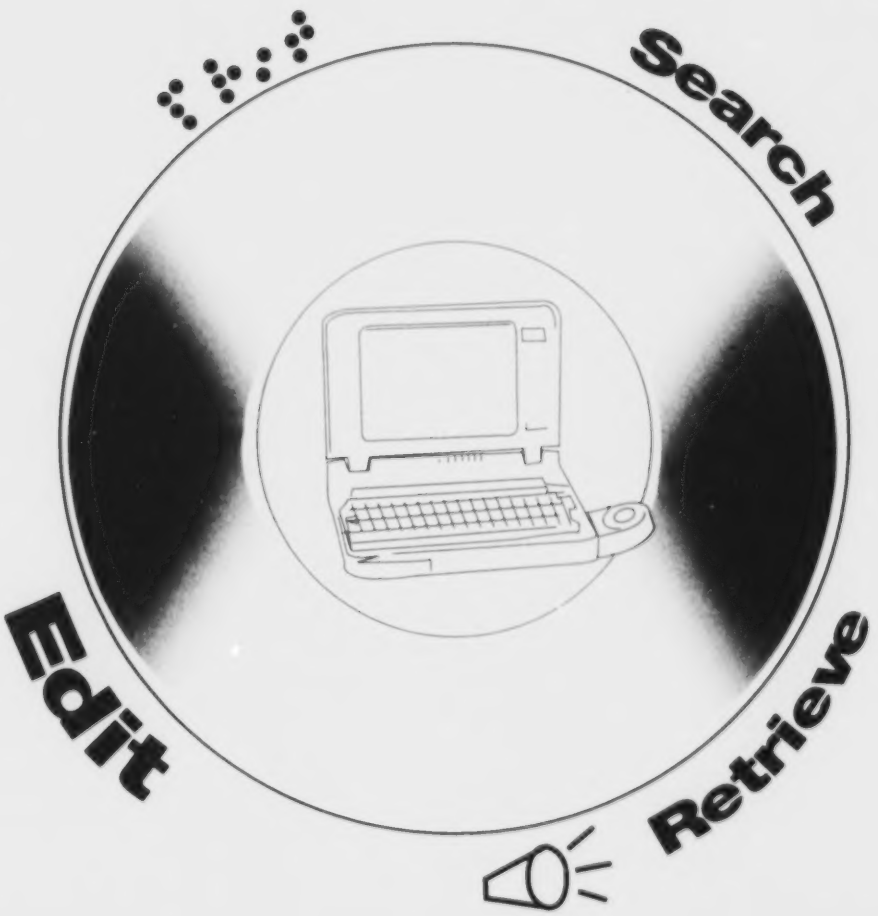
EC304764

BEST COPY AVAILABLE

Project CD-VisROM: Remote Access to CD-ROM by Visually Impaired Students was supported by a grant from the U.S. Department of Education, Office of Special Education and Rehabilitative Services, Division of Innovation and Development (Grant No. H180E20053).

Project CD-VisROM

Remote Access to CD-ROM by Visually Impaired Students



Gaylen Kapperman
Steve Hahn

Toni Heinze
Susan Dalton

Research & Development Institute
1996

ACKNOWLEDGEMENTS

The staff of Research and Development Institute (RDI) wishes to express its sincere appreciation to several important individuals without whose assistance Project CD-VisROM would not have been successfully concluded.

Dr. Bill Brittain of the College of DuPage (Glen Ellyn, Illinois) was the technical consultant to the project. He designed the CD-ROM system and wrote the section in this volume which describes it. The CD-ROM system which he designed was the heart of the project, and operated flawlessly. For that, we are eternally grateful.

The blind and visually impaired students and their teachers who acted as field testers for the strategies which we designed contributed greatly to the success of the project. Without their help, we would not have been able to refine the strategies and methods which we present in the following pages. These individuals are:

Students	*School*	*Teachers*
Israel Antonio	Schurz High School Chicago, Illinois	Mario Cortesi
Kelsey Dalton	Marengo Community High School Marengo, Illinois	Anita Forbes
April Davis	Mt. Assisi Academy Lemont, Illinois	Jodi Sticken
Maria Raquel DeGuzman	Farnsworth School Chicago, Illinois	Kathy Karlin Kinsey
April Fox	Pewaukee High School Pewaukee, Wisconsin	Becky Cauffman
Matthew Gogola	Glenbard East High School Lombard, Illinois	Tracy Wilks
Katie Hinshaw	St. Charles High School St. Charles, Illinois	Donna O'Hagan
Amit Kakkar	Maine West High School Des Plaines, Illinois	Cindy Smith
Adam Kamholz	Wheaton North High School Wheaton, Illinois	Eileen Botica
Melissa Lehman	Watertown High School Watertown, Wisconsin	Pamela Brown
Lisa Leonardi	Warren Township High School Gurnee, Illinois	Leeanne Pulvermacher

Students	*School*	*Teachers*
Theresa Miller	Lance Junior High School Kenosha, Wisconsin	Lynda Ryan
Andelicio Rodriguez	Juneau Business High School Milwaukee, Wisconsin	Charles Siemers
Maria Size	Hamilton Middle School Madison, Wisconsin	Beverly Helland
Alan Tu	Jefferson Jr. High School Naperville, Illinois	Wendy Brusich
Willie Wilson	Downers Grove So. High School Downers Grove, Illinois	Beverly Eisenhut

Four additional teachers who were able to participate in the project only during year one were: Debra Barton, Allison McKee, Diane Trotter, and Kathryn Viskant.

Ms. Jodi Sticken of Northern Illinois University (DeKalb, Illinois), in addition to being a field tester, lent her expertise in editing to the production of this volume. Without her patient assistance, the contents of the following pages would have been considerably less readable.

Ms. Anita Forbes, in addition to serving as a teacher in the project, developed sample lesson plans and "quick reference" sheets, which can be used as guidelines for developing individualized plans and materials for students with low vision.

Table of Contents

Need for Information Access 1

Overview of Project CD-VisROM 2

The System 4

The Basics of CD-ROM Explained 7

The CD-VisROM System 9

Student System 11

Assistive Technology 16

Training Guidelines 21

Ongoing Management 25

Considerations for Establishing Remote Access to CD-ROM Service 29

Appendices

- Appendix A 32
- Appendix B 36
- Appendix C 45
- Appendix D 47
- Appendix E 50
- Appendix F 56
- Appendix G 62
- Appendix H 74
- Appendix I 84
- Appendix J 90

Figure 1: Project CD-VisROM Host System 6

Figure 2: Student Equipment for Remote Access 6

PROJECT CD-VisROM

Need for Information Access

A major problem which blind and visually impaired people face is the inability to gain effective, immediate, independent access to large amounts of printed information. This problem stems from the fact that blind persons cannot read this material directly without the help of another person. Even though persons with low vision can read printed material with the use of low vision aids, such reading can be extremely slow. For example, it is not uncommon for a person with low vision to read print at rates which are slower than those of a blind person reading braille. The low vision reader may read print at rates ranging from 50 to 100 words per minute. An accomplished braille reader can read at rates ranging from 100 to 150 words per minute. Neither individual can match rates achieved by sighted persons which frequently range from 400 to 600 words per minute.

The fact that blind individuals and those with low vision have limited access to the printed word is compounded by an additional problem. The types of material found in CD-ROM software applications are commonly vast amounts of reference material. Such types and breadth of valuable printed material are nearly impossible for a blind or visually impaired person to access. For example, the last encyclopedia to be produced in braille was published in 1959. This is only one among many examples of the paucity of reference material available in braille.

As mentioned above, individuals with low vision may be able to read much of the information contained in large reference works, with the use of low vision aids, but this is extraordinarily laborious and time-consuming. Many reference works are produced in large and unwieldy formats which are very difficult to handle with the use of low vision aids. The use of head-borne aids requires holding material very close to the eyes; even with the use of reading stands this task is very cumbersome and fatiguing, and is by no means as efficient as it would be for a sighted individual reading the same material. The use of a closed circuit television (CCTV) allows considerable magnification, but a very narrow depth of focus and greatly reduced field of view make reading large reference materials very difficult. In both cases, the ability to

search and retrieve specific information is considerably more difficult for the visually impaired individual.

With today's technological advances, the gap between those able to access large amounts of current and past information quickly and efficiently—and those who cannot—widens each day. For example, there are rapidly growing avenues for easy reproduction of printed information, and burgeoning numbers of resources available on CD-ROMs, as well as the Internet. Persons with visual impairments must have access to these same vast amounts of information in order to have fair opportunities in school, at work, and in general life activities. Classroom research assignments, extracurricular activities, and work-related projects require the location, selection, retrieval and manipulation of relevant information for success. Schools offer CD-ROM capability in libraries and learning centers, but this information is not equally available to both sighted and visually impaired individuals. Not only is it critical to be able to access these up-to-date resources for academic assignments, but the skills of using this technology are also critical to applications for continued learning, and for succeeding in the work world, as well as for maintaining general independence and having a chance for success in a very competitive world.

The difficulties encountered by visually impaired persons in accessing information is reflected in The Americans with Disabilities Act and its requiring that efforts and adaptations be made to facilitate opportunities for more full and equal access for persons with disabilities.

Project CD-VisROM was designed to provide a solution to this very serious and far reaching problem.

Overview of Project CD-VisROM

Project CD-VisROM was a three-year effort supported by a grant from the U.S. Department of Education. The purpose was to develop well-tested procedures by which students who are visually disabled could have access to the vast amounts of information which are now available through the compact disc read-only-memory (CD-ROM) medium. The methods outlined in this manual represent the most cost effective procedures for providing this access.

The project began with several initial startup activities. These entailed the purchase of the CD-ROM equipment and software, and the adaptive computer

equipment and software which would be used by the Research and Development Institute (RDI) staff, the teachers and the students. The RDI staff developed the procedures for using the equipment and software which would then be field tested by the teachers and their students.

The next major step was to select the students and teachers who would participate in the project as field testers. A survey was made of potential student participants in the Chicago metropolitan area, northern Illinois region and in southern Wisconsin. From a large group of students who were blind or visually impaired, a group of 16 individuals was chosen, with an attempt to represent such variables as reading media, gender, a range of ages, and program locations. The students were seventh through tenth graders. The group consisted of an equal number of boys and girls, and an equal number of braille and print readers. Students were from urban, rural, and suburban settings. The group of 16 students was then divided into 2 groups of 8 students who were matched on gender, grade level and educational setting. Each matched pair was assigned to one of the 2 groups.

After the selection process was completed, the training phase of the project began. The teachers of the first group were trained to use the equipment and software for gaining access to the information stored on the CD-ROM system from remote sites. During the following academic year, these teachers trained their students to use this equipment and software. Both the teachers and students maintained accurate records of their activities. Periodically, that information was transmitted to the RDI staff for later analysis. During the initial student training period, the members of the second group went about their normal school routines without access to the CD-ROM system. They also maintained records of their activities regarding access to information during this period. Based upon the preliminary results achieved by the first group, revisions were made in the training procedures. During the second year of the project, the second group of teachers were trained, who, in turn, trained their students. Those students then used the system and also maintained records of their activities. That information was analyzed by the project staff.

The final phase entailed the development of the products of the project. These include the present manual and accompanying videotape. The RDI staff analyzed the information generated by both groups of field testers. Based upon that information, the strategies and procedures were revised and are presented

in their final form here. Because of the thorough field testing procedures employed during the project, the RDI staff is confident that the methods outlined in this manual can be applied in other settings and that they will prove to be very useful to the students who are given the opportunity to take advantage of the benefits that such a system can provide.

The System

The following is a general overview of the system. For technical details, the reader is referred to Appendices A and B. Two components comprise the system. The heart of the system is a computer which is equipped with several CD-ROM drives. Each drive contains a CD-ROM which holds an enormous amount of information. The second component is the computer which the student uses. That computer is equipped with adaptive software and hardware enabling the visually disabled student to have access to the information displayed on his or her computer screen. The computer must have a modem installed in it in order to allow the student to use his or her computer to communicate with the host computer equipped with the CD-ROM drives. In this way, the student can use his or her computer to search the various CD-ROMs from a remote location. That is, the student can "dial up" the host computer (equipped with the CD-ROMs) using regular telephone lines. The student need not be in close proximity to the CD-ROM system. He or she can be situated in the next room or hundreds of miles away. An additional major advantage of the system is that more than one student can use it simultaneously. In this way, a very large number of students who are widely dispersed throughout a large city, a region of a state, or an entire state can make use of the system. Literally hundreds of students can have access to one CD-ROM system which is equipped with many CD-ROM drives. This aspect of the system makes it very cost effective.

The CD-ROM system is comprised of one or more communication nodes (computers connected to telephone lines), a server (computer equipped with CD-ROM drives), and software designed to operate the system. For each telephone line connected to the system, one must have a dedicated computer equipped with a modem and the appropriate telecommunications software. Each of the communication nodes is linked to the server. The number of communication nodes dedicated to the system determines the number of

incoming lines and thus the number of students who can use the system simultaneously. For example, if three communication nodes are attached to the server, then three students can search the library of CD-ROMs simultaneously.

The server is a computer which is equipped with multiple CD- ROM drives and the appropriate software to operate them. The number of CD-ROM drives which can be attached to the server is determined by the software which is installed on the computer. The reader is referred to Figure 1 (page 6) for a graphic representation of the host system as described here.

A CD-ROM drive is similar to, but not the same as, a floppy disk drive. Each CD-ROM drive contains one compact disc. An extraordinarily large number of such discs are commercially available for installation on the system. However, a word of caution is appropriate regarding their selection. Multimedia CD- ROMs will not operate properly on this system. Only text-based discs should be installed on the system because these are the only kind which will function properly in a telecommunications situation.

The other major component of the system was comprised of the student's hardware and software. A DOS/Windows-based PC (IBM compatible computer) was used. The computer can be either a notebook or desk top machine. Project CD-VisROM utilized 486SX Toshiba laptop computers equipped with 4 megabytes of RAM and a 300 megabyte hard drive.

The student's computer must be equipped with a modem. A telephone line is plugged into the modem enabling the student to use his or her computer to communicate with the CD-ROM server. Each student computer, therefore, must have appropriate telecommunications software installed on it.

For a student with a visual disability, gaining access to the information displayed on his or her screen is the major hurdle to overcome. This is accomplished through the use of appropriate hardware and software. For a print reading low vision student, screen enlargement software can be employed for this purpose. A speech synthesizer and screen reading software can be used to enable a totally blind or severely visually impaired student to have access to the information on the screen as well. Braille reading students can also use electronic braille displays for reading the screen information. The reader is referred to Figure 2 (page 6) for a graphic representation of the student's equipment.

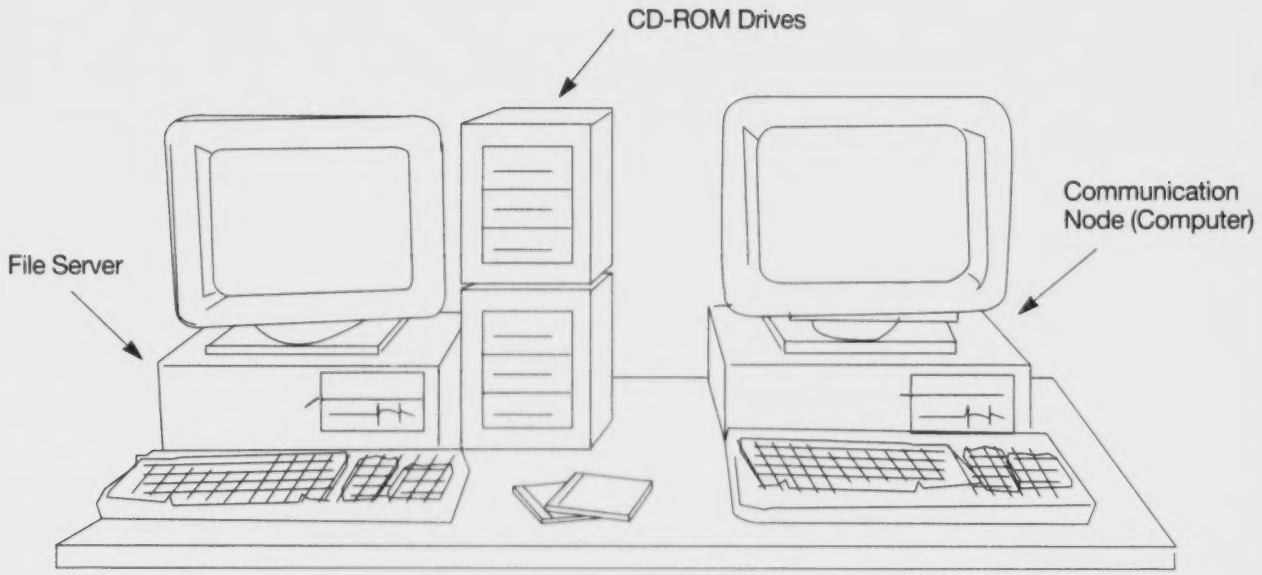


Figure 1
Project CD-VisROM Host System.

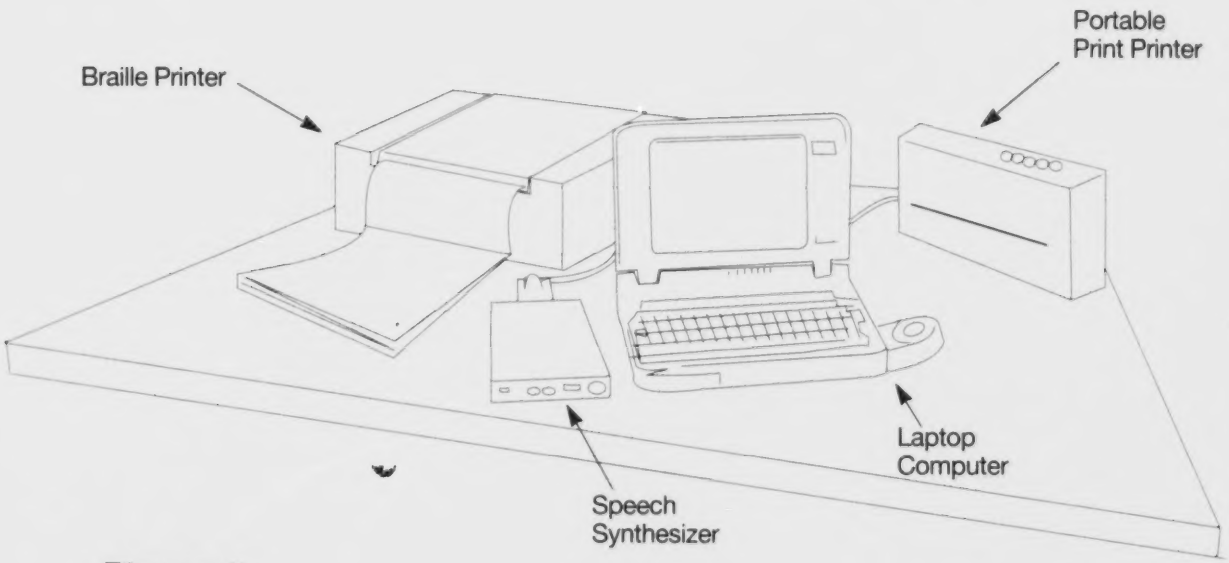


Figure 2
Student Equipment for Remote Access.

Following the procedures outlined in this manual, the student can use his or her specially adapted computer to retrieve information from the CD-ROMs on the remote server. He or she calls the CD-ROM computer system using his or her telecommunications software. Once the student is connected to the system, he or she chooses one or another CD-ROM, and following the outlined procedures, then searches the CD-ROM for the desired information. Once it is located, it can be downloaded to the student's computer. The student can either move to another CD-ROM to search for other information, or he or she can disconnect the telephone link with the server. Then, the student can review the information which he or she has downloaded. This is done using the adaptive hardware and software employed by that student.

The student has the option of converting the information to written form if he or she chooses to do so. The low vision student can print the information using word processing software and an inkprint printer. This can be done in regular print or large print. Likewise, the braille reading student can use word processing software and/or braille translation software to print the information in braille using his or her own braille printer.

The major advantage of the CD-VisROM system is that it enables a visually disabled student to exercise a great deal of independence in retrieving information. He or she can search for information without the help of sighted assistants. Once the information has been retrieved, he or she can convert it into a medium which is appropriate for him or her. This may be large print on the screen. It may be speech using a synthesizer. It may be large print using a printer, or it may be braille using an electronic braille display device or braille translation software and a braille printer.

The Basics of CD-ROM Explained

CD-ROM is a technology which is capable of storing enormous amounts of data. It is possible to store 680 megabytes (680 million bytes) of information on one compact disc. To put this number into perspective, this is the equivalent of the storage capacity of approximately 500 3.5-inch, high density diskettes. Another way to express the storage capacity of one compact disc is that it is equivalent to 300,000 single spaced typewritten pages, or 24 volumes of an encyclopedia, or 5,000 full-color images. A person reading one page per minute nonstop twelve hours a day would take nearly nine months to read the material contained on a single CD-ROM. At 2,400 baud, it would take 32 days

to transmit the entire contents of a CD ROM via a modem. Given the huge storage capacity of CD-ROMs, one can readily understand that access to this technology can be an extraordinarily powerful tool for blind and visually impaired persons who generally experience difficulty gaining access to large amounts of information.

How can a small flat disc five inches in diameter and weighing slightly more than one-half ounce contain so much information? The data are stored in the form of pits of varying sizes with flat areas between (called lands). A disc which contains its full storage capacity has up to 2.8 billion pits in a spiral track on the under side. If the track were laid out in a straight line, it would be three miles long.

In order to retrieve the information, the disc must be inserted into a CD-ROM drive. The drive is equipped with an optical head which shines a laser beam onto the spiral track. As the head moves over the track, light is reflected back to the optical head. The fluctuations in the reflected light are interpreted by software which then converts the light into signals that a computer can understand.

Before the information can be encoded, it must be found on the disc. The manufacturers of CD-ROMs provide search and retrieval software which is loaded into the computer. The software contains the protocols to carry out efficient searches. It controls the movement of the optical head and positions it at the correct location where the desired information is located on the disc. Then the fluctuating light reflections are encoded and the signals are sent to the computer. One should note that the search and retrieval process requires more time than does the same process on a magnetic hard disc. But on the other hand, it is much less expensive to store information on a compact disc than it is to store that same information on a magnetic disk.

The initial storing of information on a compact disc is a rather complex process. A master must be produced by using a laser beam to produce the pits. The master is then used to stamp duplicates. The duplicates have a covering which protects the disc from environmental influences which could destroy the data. At this writing, one cannot use one's PC to write data to a compact disc, thus the name, read-only-memory. Because of this aspect of CD-ROMs, the discs are impervious to the corrupting influences of computer viruses. It is impossible for a computer virus to "creep" into the data stored on a compact disc.

Likewise, one cannot format the disc or write over the information contained on it. But the transmission of the light energy can be temporarily disrupted if foreign materials such as dust particles and smudges from finger prints are deposited on the side of the disc where the spiral track is. This can be remedied by carefully removing the foreign material.

At this juncture, another important point should be made about the use of multimedia CD-ROMs by visually disabled individuals. Because of the vast storage capacity of this medium, pictures and sound can be added to the text. An all too common misconception is that these multimedia discs can be used by visually disabled persons. For those individuals who have little or no useful vision, multimedia discs are of no benefit. In order to have full access to the information contained on the disc, that information must be in text form only. In the system described in this volume, text-based CD-ROMs are the only ones which can be used.

The CD-VisROM System

System Description

The CD-VisROM system is a multi-user system designed to allow remote users to gain access to as many as eight CD-ROM databases. Each CD-ROM database can be entered by more than one user at any given time. The system was designed to meet the needs of visually impaired persons. Therefore, the menuing system was custom- programmed to minimize the amount of textual information on the screen, thus facilitating the use of assistive technology. A user ID and a password are required to gain access to the system; consequently, the databases are open only to authorized individuals.

Administrative personnel can gain access to the system either locally or remotely for maintenance purposes. With the exception of the menu program, the CD-VisROM system uses currently available, off-the-shelf software and hardware, and is easily configured by anyone with basic computer skills.

Topology Rationale

A remote access CD-ROM system with the ability to be accessed by simultaneous multiple users can be effected in two different manners. The first solution would be to have a single computer attached to multiple modems and CD-ROM drives running multi- tasking software. The second solution is to

use local area networking technology, with one computer acting as the CD-ROM server, and individual workstations (communications computers) attached to modems acting as the dial-in hosts.

The first method, while more elegant from a hardware standpoint, is more prone to a total system failure. Any one node, by failing, can bring the entire system down. In addition, it is more difficult to expand as needs grow. The second solution is more hardware-intensive, but by virtue of having discrete components, is far more resistant to total system failure. It also allows for easy expansion. This is the solution that was used for the CD-VisROM system.

System Components

There are two main hardware components to this type of remote access CD-ROM system: the network CD-ROM server and the individual dial-in workstations. As configured, the system has a server running Novell Netware® version 2.2 and two 4 bay CD-ROM drives for a total of eight CD-ROM drives. The software for accessing the CD-ROM drives from the network computers is Opti-Net ® VAP. The eight CD-ROM drives are directly attached to the Novell file server. The Opti-Net software allows simultaneous multiple access to any of the CD-ROMs installed on the system, limited only by the number of users allowed by the CD-ROM license agreement. As mentioned above, the menu software was designed specifically for this project.

The individual workstations are standard IBM compatible computers running MS DOS which are equipped with network interface cards and the appropriate software for gaining access to the networked CD-ROM drives, a 9,600 baud modem and remote control software. When a user dials into the system and provides a valid login name and password, he or she will have complete control over one of the workstations. It will appear to the user as if he or she were actually sitting at a computer attached to the CD-ROM network. The user's screen will show what is on the workstation's screen and his or her keyboard will operate as if it were attached to the workstation. It is also possible to print from either computer. The interface is totally transparent.

When a user has disconnected from the workstation, it will automatically reboot itself. Rebooting resets the workstation for the next user. It also corrects any trouble the user may have encountered such as the workstation locking up.

For a detailed description of procedures on how to start the system, shutting it down, and adding CD-ROM titles, the reader is referred to Appendix A.

Student System

Student Equipment

This section will describe the computer hardware and software needed for each student in order to successfully participate in a comparable undertaking. There are three components of the system for each student: computer hardware, software, and assistive technology.

Hardware

THE COMPUTER. Each student in Project CD-VisROM had his or her own IBM compatible computer equipped with a modem. It was decided to use laptop computers, but desktop computers could be used instead. Laptops were used because this enabled the student to take the computer wherever he or she went. This portability gave him or her the ability to use his or her computer both at home and at school, which meant that the student could then call into the CD-ROM system anytime he or she desired. If a desktop computer is used, this severely limits the student's ability to gain access to the system whenever and wherever he or she desires.

Although other types of computers can be used, IBM compatible systems are strongly recommended. Currently, three types of computers are used in most school systems. They are the Apple II series, MacIntosh, and IBM compatibles. Since new software is no longer being developed for the Apple II computer, and because of the restrictions inherent in the design of the computer, these are not suitable for use in a project such as this. The major drawback to using a MacIntosh is the lack of screen reading software necessary for a blind student to efficiently read the information that appears on the screen. Because of the large amount of information that appears on the screen when using a CD- ROM, it is extremely important that the student have complete control over the specific portions of text to be spoken by the speech synthesizer.

The Braille 'n Speak was also evaluated in the process of choosing a computer to use in the project. The staff decided against its use for the following reasons:

the inability to selectively read pieces of information; the inability to review the information unless it is stored in the Braille 'n Speak; the restriction of the Braille 'n Speak file structure; and the amount of editing that is needed to make the desired information useful. In the opinion of the staff, the Braille 'n Speak is a very useful tool for blind persons in many other circumstances, but it is ineffective for downloading large amounts of information stored on a CD-ROM in a remote location.

The modem. Each student's computer was equipped with a modem used to connect to the CD-ROM system. When Project CD-VisROM was initiated, 2,400 baud modems were the most commonly used. Since modem speed is a critical factor in the success of a project such as this, it is advised that faster modems be used. Currently, 14,400 baud modems are the standard modem speed, and with the rapid reduction in price of the 28,800 baud modems, either of these should be considered when designing a similar system.

In addition to modem speed, another option to consider would be the type of modem desired. There are three types of modems being used: internal, external and PCMCIA. An internal modem is most often used with desktop computers. These modems must be installed inside the computer. An external modem is connected to the computer via a serial cable and can be used with a desktop or laptop computer. A PCMCIA modem is the size of a credit card, and thus will fit into a special slot located on most laptop computers currently being produced. The type of modem selected will depend greatly on the design of the system.

If it is decided to use laptop computers, then a PCMCIA modem is suggested. When deciding which brand of modem to use, select one that has a pop-out phone jack. This type of phone connector is easier for totally blind students to use. Most PCMCIA modems use a cable that dangles from a connector on the modem. This cable must be inserted and removed each time the computer is moved. Since the pins that connect the cable to the modem are very small and fragile, the student must have very good finger dexterity to insert the cable properly into the modem without damaging it. The pop-out phone jack was found to be very reliable and durable.

The printer. Each student was also provided with an inkprint printer. Since it was deemed that portability was an important factor in the success of this project, it was decided to use portable printers. Although almost any type of printer can

be used, an inkjet or laser printer is recommended if at all possible. These types of printers provide greater readability for low vision students. Both inkjet and laser printers enable the user to quickly change both the size and contrast of the print. Most of the students who could not read the output of a dot matrix printer could read the same material when produced with an inkjet printer.

When deciding which printer to use, some things to consider include:

1. compatibility with the software chosen. It is important that the word processing program can utilize all the features of the printer, especially the commands for choosing the print size and type.
2. ease of inserting paper. Some of the students had difficulty inserting paper into the printer. This caused paper jams which resulted in printer failure. This problem can be reduced by using single sheet feeders.
3. cost and number of pages produced with an ink cartridge. The cost of replacement cartridges is an important factor when deciding which printer to purchase. The useful life of a cartridge will vary according to the size and type of the font being used by the student. Generally, the darker and larger the font, the shorter the lifetime. However, the visibility of the print is also an extremely important criteria.
4. warranty and durability. Most printers come with a one year warranty, but consideration should be given to buying extended warranties. This issue is directly related to that of durability. When deciding upon which printer to use, be sure to look for the "mean time between failure" or MTBF. This can usually be found in the technical section of the printer's manual.

Software

Operating system. The operating system is the program upon which every other program is based. Currently the most popular operating systems are DOS, Windows, and System 7.5. The first two are used on IBM compatible computers, while System 7.5 is used on the MacIntosh.

The students in Project CD-VisROM used DOS. The reasons DOS was chosen include:

1. the availability of access software for low vision and blind students. It is far easier for visually disabled students to gain access to the information

using DOS than it is using another operating system. When the project was initiated, there were no access products for Windows. This situation has changed recently with the introduction of several Windows-based screen reading programs. As a consequence, products should be evaluated before deciding upon an operating system. Currently the MacIntosh has only one screen reading and two screen enlarging programs available.

2. modem speed. This was another important consideration in deciding which operating system to use. Since relatively slow, 2400 baud modems were used in this project, it was critical that the information was sent as quickly as possible from the CD-ROM to the student. A screen full of information that is text takes less time to be sent than does a screen full that contains graphics and text. As modems become faster, this factor becomes less important.
3. familiarity with the operating system. To reduce training time, it is important to select a system with which most of the teachers and students are familiar. In this project, a majority of teachers were more familiar with DOS than they were with the other operating systems.

Remote control software. Remote control software is a special type of telecommunications software. Telecommunications software is used to connect one computer to another with a modem. Remote control software enables the caller to send every keystroke to the receiving computer, which will then act upon the keystroke. This is especially important when using CD-ROMs that require the use of function keys. For example, suppose the CD-ROM requires the F3 key to perform a search. When F3 is pressed on the student's computer, the command is passed to the computer to which he or she is linked. That computer then passes the F3 command to the CD-ROM, which activates the search command. Standard telecommunications software does not contain this essential feature.

When evaluating remote control software, here are some factors to consider:

1. the ability to use the access software with the remote control software. It was found that some remote control programs intercept all the keystrokes before the screen reading software or screen enlarging software has the ability to act upon a command. For example, suppose the command to read the line on which the cursor is located is Control L. Some

remote control programs will send this command to the CD-ROM before the screen reader has a chance to read the current line. This results in nothing being read.

2. the ability to save selected text into a file on the student's computer. This feature is essential if the student is to have the ability to read information when not connected to the CD-ROM.
3. customizable commands. This feature enables the user to change the commands the remote control software uses for its operations. By being able to customize its commands, the possibility of keyboard conflict is reduced. A keyboard conflict occurs when two programs use the same command to perform an action. For example, if the remote control software uses a Control P to activate a menu and the CD-ROM uses a Control P to print, a keyboard conflict has occurred. This will result in one of the commands being performed, while the other function will not be engaged. In this case, the remote control software's menu will be activated, while the CD-ROMs print command will not be usable.

Word processor. A word processing program is necessary for the students to read and edit the material that is saved from the CD-ROM. Although any word processor may be used, it should have the following characteristics:

1. It should be familiar to the teachers and students. This will greatly reduce the amount of training time required.
2. It should be easy to use with access products. Most screen reading programs have preconfigured settings for the most popular word processing programs.
3. It should have the ability to import ASCII files. The information that is saved from a CD-ROM is stored in an ASCII file. An ASCII file contains only text. Most word processing programs have the ability to gain access to files of this type. Another important feature related to using ASCII files is the ability to easily remove extra carriage returns. Detailed information regarding this procedure can be found in Appendix C.

Menu program. A menu program can be used which will enable the student to quickly gain access to any program. This is especially useful when working in a DOS environment. If it is decided to use a PC with Windows, or the MacIntosh, it is important that the programs be organized in a manner which

will reduce the steps needed for the student to gain access to the desired software.

Assistive Technology

This section describes the access equipment and software used in Project CD-VisROM. Because both blind and low vision students were involved with the project, the section is divided into those two categories.

Technology for Blind Students

Each blind student needs the following in addition to the computer, hardware and software listed above: speech synthesis (a speech synthesizer and screen reading software), a braille translator, and a braille printer.

Speech Synthesis

For the production of synthetic speech, two components are needed: a speech synthesizer and appropriate screen reading software. A speech synthesizer is hardware that produces human- sounding speech. It is used in conjunction with the screen reading software. Currently there are three types of speech synthesizers available: internal, external, and PCMCIA. The type of synthesizer selected will depend upon the type of computer chosen. In general, internal speech synthesizers are used with desktop computers. They have to be installed in a computer the same way an internal modem would be installed. An external speech synthesizer can be used with a desktop or a laptop. They are attached to the computer using a serial port. A PCMCIA speech synthesizer fits a PCMCIA slot found on most laptops currently available.

CONSIDERATIONS FOR SELECTING A SPEECH SYNTHESIZER. In selecting a speech synthesizer, it is recommended that the following issues be considered:

1. type of connection available on the computer. In general, if the computer has an internal slot which the synthesizer will fit, use an internal synthesizer. If the computer has no such slot, then an external synthesizer must be used.
2. quality of speech produced. It is not always necessary to get the highest quality of speech available. Most people who rely on speech synthesis can learn to understand a less human- sounding voice without difficulty.

3. price. Speech synthesizers range in price from a few hundred dollars to over a thousand dollars. The price is directly related to the quality of the speech. Generally the higher the price, the better quality of its speech.
4. screen reading software used. This is an important factor. Not all speech synthesizers work equally well with all screen reading programs. In fact, some screen reading programs will not work at all with certain speech synthesizers. To ensure that they will work together, it is advised that the producer of the screen reading program be contacted. The company should also be able to give you the limitations that a selected synthesizer might have with its product.

Considerations for selecting screen reading software. When deciding which screen reading software to purchase, consider these factors:

1. compatibility with the speech synthesizer. This issue was addressed in the previous section.
2. ability to select portions of the screen to read automatically. This feature was found to be very efficient for achieving access to information by the blind user. It allows the user to quickly have specific portions of the screen read automatically as that information changes.
3. the ability to save and retrieve the speech settings. These should include the settings for pitch, rate, volume, and areas of the screen to be read. The screen reader enables the student to save these settings for each program that is used.
4. ease of learning. This factor is important for reducing the amount of training time required for the students and the teachers.
5. ease of use. Ability to maintain hand position on the home row keys while using the screen reading program enables more efficient operation of the program. When hands must be removed from the home row position, as is necessary with some screen reading programs, that efficiency is diminished. Logical commands and readily-established speech settings also foster ease of use.
6. cost. Screen reading programs range in price from a few hundred dollars to over $1000, with the average price approximately $500. Generally, the higher the cost, the more features are included in the program.

7. compatibility with chosen application software. To determine if the chosen screen reader will work in conjunction with a program, the producer of the screen reader may be asked for a demonstration copy. The "demos" are free and usually contain a full feature version of the program that will stop working after a period of time. If a demonstration copy is not available, arrangements may be made to use the software for a short evaluation period.
8. the ability to eliminate possible keyboard conflicts. There is one rule of thumb for screen reading programs: the more application programs used, the greater the chances of creating a keyboard conflict. A keyboard conflict occurs when two programs use the same keystrokes to perform two separate actions. For example, suppose the word processing program uses ALT P to print, while the screen reading program used ALT P to read the current paragraph. When ALT P is pressed, one of the programs will prevent the other from performing its action. In this case, the current paragraph will be read every time the ALT P command is used, and the print command will never be issued to the word processing program. Therefore, it is essential that the speech program have some method for eliminating this conflict; most use one of three techniques:
    a. bypass command. A bypass command tells the screen reading software to ignore the next command. This enables the other program to act upon it.
    b. unusual commands. Some screen reading software use commands that few other programs use. This results in awkward commands for the screen reader.
    c. changeable commands. A few screen reading programs allow commands to be changed so they will not be the same ones that an application program is using. This technique was found to be the most useful in Project CD-VisROM.

Braille Production

In addition to having technology for speech synthesis, each blind student needs the technology to enable him or her to read information via the braille medium. This technology consists of a braille printer and braille translation software, or an electronic braille display.

Braille Printer

Considerations for selecting a braille printer. It is important that the blind student have access to a braille printer for producing paper copies of documents. Some important factors for choosing a braille printer include:

1. compatibility with braille translation software. This should not be a problem since many of the translation programs can be configured to drive a wide variety of braille printers.
2. price. This is a very important factor in deciding which braille printer to use. Presently, the price of a braille printer ranges from $1500 to well over $4000. The less expensive printers were able to meet the needs of the students in the project.
3. speed. The speed of printing a document is directly related to the purchase price of the printer. The less expensive models emboss at about 15 characters per second, while the more expensive versions emboss at about 40 characters per second.
4. amount of expected usage. The expected usage is an important consideration. Generally, the higher the cost of the braille printer, the more durable it is. If heavy usage is expected, then a more costly printer should be purchased.

Considerations for selecting braille translation software. Braille translation software is used to translate the saved information into braille. Some considerations for choosing a translator include:

1. accuracy of the translation. Modern braille translation programs have achieved remarkably high degrees of accuracy.
2. ability to import the selected word processor's files. This can be restated as: "Can the braille translator use the documents created by the word processor?" The answer to this question must be "yes" if it is to be of any use to the blind student.
3. ease of use. It should not require a lot of time or effort to produce a braille version of the documents wanted in braille.
4. compatibility with screen reading software. For a braille translator to be usable by a blind student it must work with the selected screen reading software.
5. cost. Most braille translators cost about $500.

ELECTRONIC BRAILLE DISPLAYS. It is possible that electronic braille displays could be put to good use in a project such as this. However, sufficient resources did not exist to evaluate such devices. Therefore, the staff cannot speak to the effectiveness of the use of braille displays in gaining access to the information stored on remote CD-ROM software.

Technology for Low Vision Students

The low vision students need two methods for enlarging the material they encounter. The first method is screen enlargement, and the second is print enlargement. Screen enlargement gives the low vision user ability to enlarge the material that is displayed on the computer screen. Print enlargement gives the user the ability to enlarge the material that is printed on a printer.

Depending upon the degree of vision loss, it may not be necessary to use screen enlargement. Some low vision users can gain access to the information displayed by making minor changes to the computer's settings. These changes include: adjusting the screen's brightness and contrast, changing the colors used, using software to enlarge the cursor or mouse pointer, or using a larger monitor. Also, other low vision devices may be used in lieu of screen enlargement. Large print output can sometimes be achieved by changing the default font used by the printer, and printing a darker copy.

Screen Enlargement

Currently, there are two methods for providing screen enlargement. The first method uses a combination of computer hardware and software, while the second uses software only. It is suggested that both methods be evaluated when deciding upon a screen enlargement method. Some factors for evaluating screen enlargement products include:

1. range of enlargement. The available range of enlargement is from 2 to 16 times the normal size. It is important to remember that the greater the enlargement, the smaller the field.
2. clarity of enlarged letters.
3. compatibility with hardware and software, including any screen reading program.
4. ability to enlarge select areas of the screen. The screen enlargement software should give the user the ability to determine what portions of the

screen are to be enlarged, along with how much of the screen should be enlarged. For example, the option should exist to be able to enlarge the images appearing on the entire screen, or any portion of the screen.

Print Enlargement

Special software that will enlarge the print from the printer may or may not be necessary. Many currently available word processors include this feature. If a PC with Windows or a MacIntosh is used, this feature is readily available. If DOS is used, some of the most popular word processors have this ability, while many older programs do not. If it is found that the word processor being used does not have this feature, then special font programs can be purchased.

The reader is referred to Appendix D for a list of specific equipment and software used in Project CD-VisROM, and where these items may be obtained.

Training Guidelines

The training procedures incorporated into Project CD-VisROM consisted of three components: (1) the training of the teachers by RDI staff, (2) the subsequent training of students by the teachers in the project, and (3) the technical support for teachers and students by RDI staff.

Teacher Training

Teachers were trained on all aspects of the system during a one-week workshop. The six-hour daily training sessions began with basic computer operation and advanced to accessing the CD-ROM based material and using the assistive technology. Teachers varied in prior computer knowledge and experience, but the minimum suggested requirements are basic computer knowledge and word processing skills.

The teacher training session was held during the summer for the following reasons:

1. teacher location. Teachers were located in the Chicago metropolitan, northern Illinois and southern Wisconsin areas. Since they covered such a wide area, it would have been very costly and time consuming to provide individual training at the various sites.

2. teachers' schedules. Since the teachers were from a variety of school districts, it would have been very difficult for them to receive time off during the school year, during the same time period, to participate in the training.
3. level of technical expertise. Some of the teachers, before being involved with the project, had limited computer experience. It was felt that a more intensive training period, with time for continuing practice in using the equipment, the word processing and adaptive software programs, and in accessing the CD-ROMs would be important for the teachers to acquire the necessary skills before teaching them to their students.

A list of the specific training topics covered throughout the workshop can be found in Appendix E.

Student Training

After acquiring the necessary knowledge and skills, each teacher was responsible for training his or her student to use the equipment provided. The RDI staff felt strongly that the teacher be in control of this phase of the project, determining when the student training was held, where it was held, the topics covered, and the sequence in which the material was taught. As part of this phase, both teachers and students kept logs on their progress. Teacher logs outlined topics presented, difficulties encountered, and solutions which helped; student logs kept track of projects and assignments worked on with the CD-ROMs, type of searches made, difficulties encountered, and solutions. Samples of these logs are included in Appendix F. Teachers were also encouraged to write lesson plans and develop teaching materials. Examples of these may be found in Appendix G, which delineates the topics and skills introduced during each one-month period by one of the teachers in the project. These procedures could be replicated for many high functioning low vision students.

The operation of the system was taught on an individual basis, allowing teachers to have the opportunity to gear lessons specifically to their students. Since the students were at various levels of computer knowledge, some teachers were required to start at very basic computer skills, while others were able to start with the adaptive software and go right on to remote access procedures. However, a summary of the steps that were taken to introduce the system operation to the majority of students follows:

1. Introduction to the basic computer—connecting all the cables, familiarization with all the keys, outlets, ports, etc.; brief explanation of how the telecommunications software functions.
2. Introduction to the word processing program, followed by the screen enlargement software or speech software; familiarization with printers and their operation, including how to print information onto the regular printer; teaching braille reading students how to use the braille translation program and the braille printer.
3. Introduction to the telecommunications software program and how to dial into the system; how to locate information in the various CDs; how to save, download, "clean" files (remove extraneous carriage returns), and print information using their printers. (Note: Since individual CDs have different commands and steps for accessing and saving information, it helped to work with each one separately. Many teachers made up "quick reference sheets" to assist their student with specific commands for each CD. Several examples of these are included in Appendix H). The reader is also referred to Appendix C for suggestions regarding the removal of extraneous carriage returns.

After these three major steps had been taught, students were then able to review their retrieved information, edit it as necessary, and use whatever information would be helpful to their particular task.

Time Allotment for Training

The time available for each student to work on Project CD- VisROM was at a premium. It is often a problem for visually impaired students to find enough time during the school day to attend to their basic school work, especially if many adaptations must be made. Students who are in advance level courses, or those who have a heavy class load, may have difficulty setting aside time to work on this training. Students who appeared to be most successful in the training and use of the equipment were those who had specific time for computer training included in their class schedule, or those who scheduled their training sessions before or after regular school hours. Several teachers suggested that students may do better if the training sessions were held as an after school program, or over the summer as a separate course or "computer camp."

The time required to become independent in using the system varied greatly among the individual students. It ranged from learning to retrieve information

independently after being shown the operation only once, to requiring nearly ten months. This time variance was influenced by many factors, especially the time available for them to work on learning the system, and the level of their previous computer skills.

Technical Support

Technical support was provided by RDI staff to both teachers and students. Most of the technical support was provided over the phone. If the staff was not able to resolve the problem, then they made on-site visits to the teacher's school.

To facilitate the use of this technical support, each teacher and student was given a phone card that could be used to contact the staff at RDI. The phone card eliminated the need for the teacher or student to be charged for the call. To reduce the possibility of fraud, the phone card was set up so that it could only be used to contact RDI staff.

When designing a similar project, the area of technical support should be considered as essential if the project is to be successful. Without strong technical support, the teachers and students may become very frustrated and decide not to use the system.

In addition to providing technical support, the RDI staff was responsible for keeping the CD-ROM system operating. The amount of time required for this was minimal. The major duties included creating the accounts for each teacher and student, installing and updating the CD-ROM software, and resetting the system after a crash. In addition, the RDI staff monitored the system usage reports to determine how effectively the system was being used.

Questions After Training

Regardless of the amount of training provided, there will always be questions that arise afterwards. In anticipation of this, a list of the most common questions teachers encountered follows:

- **Which CD-ROM** would be the best for finding material on (subject)?
- Which **type of search** should I use for a particular CD-ROM?
- How do I **save information** from the CD-ROM onto my computer?
- What **search terms** should I use if I'm looking for information on (subject)?

- When I print out material in large print or braille, why is one **line** normal **length**, and the second line shorter?
- How do I **download** the CD-ROM article into my word processor?
- Which **screen reading command** do I use to read the highlighted option on a menu, or to read the contents of the current screen?
- How do I turn off **call waiting** on my phone?
- Why doesn't the **host modem answer**?
- How do I **exit** the CD-ROM?
- Why was my **file empty** after I downloaded an article?
- My computer uses **speech**, but when I turn on my computer it **does not boot up**. What should I do?
- Can I put **my own software** on the computer?

Ongoing Management

Personnel Qualifications and Job Responsibilities

While the individual who manages the system does not necessarily have to have computer network training to manage the day-to-day operation, the individual who initially sets up the system should have such network skills. This person's services can be obtained on an independent contractor basis. The individual should be enjoined to train the manager of the system in its operation. The operation manager should have a rather extensive background in computing and adaptive computing, and should possess the following knowledge and skills in order to carry out the day-to-day responsibilities of managing the system:

- Research the computer and printer to be used
- Select and set up the access products used
- Determine the needs of the teachers/students involved and research the CD-ROM databases that fit these needs
- Select and install the word processing and remote control programs used
- Set up accounts on CD-ROM server
- Conduct training workshops for teachers
- Advise teachers on training their students
- Advise teachers and students on the acquisition of appropriate hardware and software

- Assist teachers and students in the installation of software
- Provide timely technical support to teachers and students
- Trouble shoot equipment failure
- Update computer software
- Update CD-ROM library
- Monitor functioning of the system
- Resolve system "crashes"
- Trouble shoot problems encountered by users
- Review and analyze usage records

Space

A relatively small amount of space is required to house the CD-ROM system equipment. One or two six feet by three feet tables are sufficient to accommodate the server and the communication nodes. The amount of space that is required is determined by the number of telephone lines which are linked to the system. Each telephone line requires a communication node (a computer). In order to keep track of the software which is installed on the communication nodes, and the server, a monitor should be attached to each communication node; the server can also have a keyboard attached. Therefore, at a maximum, a space of twelve feet by three feet would be sufficient to accommodate the largest system.

Telephone Lines and Telephone Numbers

The maximum number of telephone lines which can be connected to the system is determined by the license agreement which is purchased from the vendor of the networking software. For example, if a ten-user license is purchased, up to ten telephone lines could be linked to the system. As mentioned above, for each telephone line, one must have an individual communication node. The local telephone service provider can install the individual lines. It is highly recommended that provisions be made for only one telephone number to be assigned to the system. If more than one line has been installed, provisions can be made for "roll over" service, using this single number. This service works as follows: (1) all users call the single number, and (2) if the first line is busy the system "rolls over" to the next line which is not busy. In the case of a multiple line system, more than one student can use the system, but only one telephone number is necessary.

It should be noted that when the system was designed, the staff decided that each student and teacher involved with Project CD-VisROM would have his or her own account on the system. This was necessary to ensure the accuracy of the data that was collected. Since only one workstation, with one telephone line, was available on this system, and there was a possibility that all 16 students could attempt to use the system at the same time, individual calls were limited to one hour. This means that a student who wanted to use the system had one hour to search and download the material he or she needed. There was, however, no limitation on the number of calls which could be made in a 24 hour period. This means that a user could call several times a day for up to an hour each time.

There was concern that the students might not be able to complete their work in the allotted time; however, they had no difficulty finding and saving the desired articles within the time limits. In fact, out of approximately 1400 calls made to the system, only 10 were disconnected for exceeding the time limit.

Costs

The initial costs for setting up the CD-ROM system fall into two categories: the CD-ROM hardware and networking software, and the initial purchase of the CD-ROMs. It is virtually impossible to predict with any accuracy what the costs will be due to the ever-changing situation with regard to technology, and the fact that systems vary radically in their sophistication and complexity. As a consequence, an estimate for the initial costs for hardware and software could range from $5,000 to $30,000. This includes the cost of the server, the CD-ROM drives, the communication node(s), and the networking software; it does not include the cost of the student's hardware and software.

The cost of CD-ROMs is also extremely variable, depending upon how many are purchased and the cost of each individual CD- ROM. Some can be gotten for a one-time expenditure while others require ongoing subscriptions. An estimate of the range of costs involved in the purchase and initial subscriptions to CD-ROMs is $500 to $10,000.

The CD-ROM service provider pays the cost of the local telephone charges for the line or lines. The user pays long distance charges if he or she calls from outside the local calling area. If many of the students will use long distance to call the system, and if the CD-ROM service provider wishes to pay for the

long distance charges, an 800 toll-free line can be provided. This can be done by contacting a major long distance service provider. The various providers offer a myriad of plans. Careful attention should be paid to the selection of the plan. For example, if the CD-ROM service provider believes that a majority of calls to the system will be made in the evenings and on the weekends, then a plan should be chosen which will minimize the charges for calls made during those time periods. Given that the costs of different telephone plans will vary, and that individual users will spend varying amounts of time on the system, it is difficult to predict how much these charges will be. However, several sources can provide helpful information. The local telephone service provider can give accurate estimates of how much each line will cost on a monthly basis. In addition, if a toll- free line is provided, the various service providers can give accurate per time unit costs. These vary depending upon the time of day and the plan which is chosen.

Another cost which should be taken into consideration is that associated with updating the CD-ROM Library. As mentioned above, some of the CD-ROM titles may be a one-time-only purchase. These may pertain to such topics as history. Other titles require a quarterly, semi-annual, or annual subscription. As a consequence, this can represent an ongoing cost. These charges can vary from hundreds to thousands of dollars per year. Therefore, in choosing CD-ROM titles, the issue of ongoing costs must be taken into consideration.

The reader is referred to Appendices I and J for sources of CD-ROMs and information dealing with network technology.

Recordkeeping

Metering software can be installed on the server to record the interactions of the students with the system. Using this method, such data as time of connection and disconnection, CD-ROMs searched, student identification number, and other information can be recorded. However, the actual topic which was searched cannot be revealed through this method. In order to justify the costs involved in the operation of the system, it is highly recommended that such software be installed on the server. In this way, accurate reports of its usage can be developed. In addition, monitoring of the frequency of use of all of the CD-ROM titles can be accomplished. If one or another is not used on a frequent basis, it could be replaced with another title which the students may find more useful.

License Agreements

For many CD-ROM titles used in a remote access system, multiple-user license agreements must be purchased. Generally, the larger the number of users, the more costly the agreement is. The individual who is responsible for the selection and purchase of the CD-ROM titles must take into consideration the license agreements which may be required.

Problems

The possibility of electrical failure should be taken into consideration in planning for the purchase of equipment. If no backup electrical supply exists, the system must be manually rebooted after a disruption of electrical power has been experienced. As a consequence, the staff recommends that a backup battery system be installed in the system. American Power Conversion of West Kingston, Rhode Island manufactures several battery power backup systems. At this writing, the cost of various models ranges from $400 to $1,700. The less expensive systems have the capability of providing power for a period of minutes, while the more expensive models provide power for days. Project CD-VisROM used a relatively inexpensive system, and found it to be most satisfactory.

Considerations for Establishing Remote Access to CD-ROM Service

There is a myriad of reasons that justify the establishment of a system for providing remote access to CD-ROM by visually disabled youngsters. First and foremost is the provision of up-to-date educational services for blind and visually impaired students in the organization's service region. As noted earlier, there are two major advantages for visually disabled students using the system. These are dramatically improved access to a very large quantity of information, and increased independence on the part of the students in their efforts to search out information. For example, students who participated in the CD-VisROM project identified numerous ways in which this access gave them a fairer chance to be successful in school. A few of these examples included:

- "It gave me more equal access to the same information all the other students could read and use."
- "I was able to get my work done by myself. I didn't have to depend on parents, friends, librarians. I had control over my own research

and writing. I could work at any time—I didn't have to wait until someone could take me to the library or read materials to me or make larger copies for me."

- "I got better grades and wrote better reports."
- "My writing and typing and keyboarding skills really improved, and I'm using these skills in all my schoolwork and even extracurricular activities."
- "I found information I never even knew was available."
- "It let me produce reports and assignments in braille for me to use, and in print for my teachers; this avoided a lot of confusion with my teachers."
- "I have a lot more pride in my work—I'm doing a lot more of my own work, my own research, my own writing, my own editing."

A second reason is to be able to exercise control over the type of content to which the students can gain access. As the reader is aware, a vast amount of information exists on the Internet, some of which is of dubious quality. In the case of CD- ROM technology, controlling the type of information which is available to the students can easily be accomplished by appropriate selection of CD-ROM titles. Students using this system can gain access only to the information which is available on the CD-ROMs which have been installed on the system. In this way, the students can benefit from having independent access to large amounts of information without the possibility of being exposed to information which may be considered inappropriate, if this is of concern to the educational organization.

A third reason is to establish the organization's position of leadership among providers of services for students with visual disabilities. An effective public relations effort can highlight the provision of this service. For example, the opening screen which the user sees each time he or she uses the system can include the appropriate credits for the sponsoring organization and its leadership personnel. Such a service is also unique enough to warrant the attention of the public media such as television, radio, and newspapers, bringing to the attention of appropriate audiences the quality of services which the organization is committed to offer. Thus, the organization benefits as well as the students whom it serves.

One approach to funding the CD-ROM system is to include the cost of the initial purchase and installation of the system, as well as the ongoing opera-

tional costs, in the organization's budget. A second approach is to seek funding for the initial setup costs from outside the organization with the provision that the ongoing costs would be borne by that organization. It is not uncommon for some public or private funding agencies to provide initial "startup" funds given a guarantee that the recipient organization will match those funds with its own. In this case, the matching funds would be used to insure the system's continued existence. A third option is to seek funds for the entire project from outside the organization. In this case, the granting agency must supply both the "startup" funds and the funds to defray the ongoing expenses. The second part of this option is the most difficult to bring about. If outside funding is sought to meet ongoing costs, the organization is committed to a continuous search for adequate funding. Otherwise, a sizable amount of funds must be amassed so that the proceeds from the investment of those funds could be used to support the ongoing costs.

APPENDIX A

Workstation Instructions

File Server and Dial-in Workstation Instructions

Starting the System

There are only two steps to bring up or start the system after it is configured. They are: bringing up the server and starting the workstation.

1. **Bringing up the Server**
   A. The server must be brought up before any dial-in workstations can be started
   B. Turn on the CD-ROM drives
   C. Turn on the monitor
   D. Turn on the computer
   E. When asked: "Value added processes have been defined. Do you wish to load them?" press 'Y' <ENTER>
   F. When the ':' prompt appears on the screen, the server is up and running

2. **Bring up a Workstation**
   This simply involves turning on the monitor and computer.

Shutting Down the System

In the event the server must be shut off for any reason, it should always be brought down in a logical manner.

A. Always bring down the server before shutting it off
B. Type DOWN <ENTER> at the ':' prompt
C. When asked: 'Active files open. Halt network?' type 'Y'
D. When the ':' prompt reappears, shut off the server, monitor, & CD-ROM drives

Adding CD-ROM Titles

Note: This section presumes that the user is conversant in MS-DOS batch language and has the ability to manipulate and edit DOS batch files.

The CD-ROM drives are numbered 0 to 7 from bottom to top. Always start loading CD-ROMs from the bottom.

A. At the SERVER: prompt on the *NETWORK SERVER* type ONET DB <ENTER>

B. Type A <name of CD-ROM> <number of disks> for example A ERIC 1 <ENTER>
C. Type M <name of CD-ROM> for example M ERIC <ENTER>
D. Add any additional CD-ROMs by repeating steps B and C
E. Exit ONET by typing 'E' <ENTER>
F. At the *DIAL-IN COMPUTER* log on as SUPERVISOR
G. At the menu type 'Q' and enter the password 'PAST' <ENTER>
H. Type 'FLAG MENU.TXT N' <ENTER>. This makes the file read and write enabled
I. Edit MENU.TXT and make appropriate changes to the menu screen. Do not change the format!
J. Type 'FLAG MENU.TXT SROH' <ENTER>. This makes the file sharable, read-only, & hidden
K. Type 'FLAG*.BAT N' <ENTER>, where * is the number of the selection on the menu
L. Edit the batch file using the following example: (The lines beginning with REM are comments inserted for clarification.)

```
@echo off
REM The next line enters startup information in
REM the usage database
METER LOGIN NEWS\USAGE\AUDIT.DBF 9999 -A

REM The following line puts the message in the
REM middle of the screen
REM This example is for the News Digest database
REM The %%A is case sensitive
CLS
FOR %%A in (eeeeeeeeeee) do %%Acho.
ECHO Please wait while News Digest loads.
ECHO

REM The next two lines start the CD-ROM session
REM and open the News Digest database
F:\OPTINET\ONET -Q -A > 1NUL
F:\OPTINET\ONET -O NEWS > NUL

REM The next three lines switch the drive to the
REM FOF directory on drive C:, which is the
REM location of the News Digest software and start
REM the database
```

```
C:
CD\FOF
EP -B

REM The next two lines close the News Digest
REM database and end the CD-ROM session
F:\OPTINET\ONET -C > NUL
F:\OPTINET\ONET -E > NUL
REM The next lines switch back to the network
REM drive, close the usage database and returns
REM the user to the Main Menu that lists the
REM available CD-ROM databases
F:
METER LOGOUT NEWS\USAGE\AUDIT.DBF -A
CD\LOGIN
```

M. Type 'FLAG*.BAT SROH' <ENTER>
N. Type 'EXIT' <ENTER> at the DOS prompt to return to the menu
O. Log off system and log back in to test the CD-ROMs.

5. **Other Notes:**
   A. A disk image of the C: drive is in F:\PUBLIC\C. You must be logged in as SUPERVISOR to access these files.
   B. To access the usage database, log on to a dial-in workstation as SUPERVISOR, exit to DOS (see 4G above) and change directories to F:\USAGE. Type BROWSE to start the database program. See Optinet documentation for further information.

6. **Additional Disks**
   A. BOOT DISK-Replaces the C: drive in event of a C: drive failure. It performs all the functions of the C: drive.
   B. LOGIN DISK-Has backup copies of the files in F:\LOGIN, which are all the user editable network files.
   C. REBUILD DISK-This disk, when booted, will automatically rebuild the C: drive on the dial-in workstations. It reformats the drive and copies all the necessary files. When it is done, remove the disk and reboot the workstation.

APPENDIX B

Batch Files

Batch Files/Setup

This appendix contains the startup files for the communications node. These files include the AUTOEXEC.BAT, CONFIG.SYS, and the CD-ROM selection menu. The Config.sys and Autoexec.bat files are automatically loaded each time the communication node is rebooted.

Config.sys File

In addition to the 'normal' commands, the Config.sys file loads the necessary device drivers to connect the communication node to the network.

```
DEVICE=C:\DEVICE\HIMEM.SYS/m:1
DEVICE=C:\DEVICE\EMM386.EXE noems frame=e000 i=b000-b7ff i=c800-
    cfff i=d000-dfff RAM
DOS=HIGH,UMB
FILES=50
BUFFERS=10
LASTDRIVE=E
DEVICEHIGH=C:\DEVICE\NETUSR.SYS/N:2/U:CDROM1
SHELL=C:\COMMAND.COM C:\ /P/E:256
DEVICEHIGH=C:\DEVICE\SMARTDRV.SYS 1024
```

Autoexec.bat File

The Autoexec.bat file performs several important functions. It loads a Netware driver, Microsoft CD-ROM extensions program (needed to access a CD-ROM), double checks to see if the network's server is running, and runs the program that controls the login procedure.

```
@ECHO OFF
PROMPT $p$g
PATH C:\;C:\DEVICE
:start
LOADHIGH C:\DEVICE\IPX
C:\DEVICE\MSCDEX /D:$OPTINET/M:4/E
LOADHIGH C:\DEVICE\NETX
LOADHIGH C:\DEVICE\DOSKEY
F:
if not exist f:login.exe start:
D
```

D.bat File

This program performs the following functions. It starts the remote control program, displays the file that contains the opening message that appears each time someone logs onto the system, starts the metering program, activates the login procedure, executes the program that is used to control the CD-ROM access, and reboots the communication node after a user has logged off the system. The lines beginning with REM are comments inserted for clarification.

```
@ECHO OFF
CLS
REM Start the remote control program
C:\CLOSEUP\CUSTS TIME=60 GLOBAL=15
REM Start the metering program
F:\NETUTILS\METER RESET\USAGE\AUDIT.DBF -a-s-u
CLS
COPY TITLE.TXT CON>NUL
REM Prompt the user for name and password
LOGIN
:NETCHECK
IF EXIST Z:\PUBLIC\SYSCON.EXE TOGO EXIT
F:
LOGIN
GOTO NETCHECK
:EXIT
IF EXIST F:\NETUTILS\YES.DAT GOTO OK
GOTO END
:OK
REM Run the CD-ROM selection menu program
CDMENU
:END
ECHO
CLS
REM Reboot the communications node after the user has disconnected
WARMBOOT
```

CD-ROM Selection Menu

This program is the heart of the system. All the user interaction with the system is controlled with this program. The lines beginning with an ' are comments inserted for clarification, or space holders.

```
' Copyright William Brittain, 1993
'
DEFINT A, Z
DIM message$(23)
hold=1
j=0
t=0
m=0

' Display the title screen. It appears as follows:
'                    Remote Access CD-ROM Project
'                      This is a private system.
'
'                      If you do not have a login
                         ' please hang up now!

OPEN "f:\login\title.txt" FOR INPUT AS 1
WHILE NOT EOF(1)
     t=t+1
     LINE INPUT #1,title$(t)
WEND
CLOSE
ON ERROR GOTO NOFILE

'The following section displays the contents of a message file.
'The message file is an ASCII file that contains information the
'user might be interested in. Project CD-VisROM staff used this
'file for notifying the users of any difficulties or updates that
'were made to the system.

OPEN "f:\login\MESSAGE.TXT" FOR INPUT AS 1
WHILE NOT EOF(1)
    m=m+1
    LINE INPUT #1,MESSAGE$(m)
WEND
CLOSE
CLS
TEMP=2
FOR K=1 TO m
    PRINT message$(K)
```

```
NEXT
PRINT
PRINT "Press any key to continue.";
WHILE INKEY$ = "":WEND
'
NOMESS:
ON ERROR GOTO 0
restart:
ON ERROR GOTO 0
CHDIR "f:\login"
COLOR 7, 1
CLS
    TEMP=2
    FOR K=1 TO t
        LOCATE K+TEMP,40-(LEN(TITLE$(k))/2)
        PRINT title$(K)
  NEXT
'
'The following section displays the CD-ROM selection menu and
'calls the batch file that starts the selected CD-ROM. The menu
'looks like:
'
'                    Main Menu
'
'          1. Microsoft Bookshelf
'          2. Grollier Encyclopedia
'          3. News Digest
'          4. Magazine Articles
'          5. World History
'          6. U.S. History
'          7. Change Password
'
'Below the menu a prompt would appear. The exact message
'displayed depends upon what the user enters at this point. If a
'valid number for a CD-ROM is entered, the CD-ROM would be
'started. If an invalid number or letter is entered, the user
'would be notified, and if the user asked to log off the system, a
'confirmation message would then be displayed.

OPEN "f:\login\menu.txt" FOR INPUT AS 1
WHILE NOT EOF(1)
```

```
    j=j+1
    LINE INPUT #1,menu$(j)
WEND
CLOSE
printmenu:
    CLS
GOSUB Delay
LOCATE 4,35
PRINT "Main Menu"
GOSUB Delay
TEMP=6
FOR K=1 TO j
    LOCATE K+TEMP,20
    GOSUB Delay
    PRINT menu$(K)
NEXT
GOSUB Delay
LOCATE j+8,8
PRINT "Please enter menu number"
LOCATE j+10,8
GOSUB Delay
PRINT "or enter the letter L to logoff the system";
GOSUB GetKey
REM IF UCASE$(choice$)="R" THEN
REM GOTO printmenu
IF UCASE$(choice$)="L" THEN
    GOTO LogOut
ELSEIF UCASE$(choice$)="Q" THEN
    LOCATE j+12,8
    PRINT "Enter password";
    INPUT PWord$
    IF UCASE$(PWord$)="PAST" THEN
      CLS
      PRINT "Type 'EXIT' to return to menu"
      SHELL
      'END
    ELSE
      GOTO BooBoo:
    END IF
ELSEIF VAL(choice$) <1 OR VAL(choice$) >j THEN
    GOTO BooBoo
```

```
ELSE
    SELECT CASE VAL(choice$)
      CASE IS=1
        GOSUB first
      CASE IS=2
        GOSUB second
      CASE IS=3
        GOSUB third
      CASE IS=4
        GOSUB fourth
      CASE IS=5
        GOSUB fifth
      CASE IS=6
        GOSUB sixth
      CASE IS=7
        GOSUB seventh
      CASE ELSE
        GOSUB BooBoo
    END SELECT
END IF
GOTO printmenu
'
'
'Start the desired CD-ROM title. When finished, the user is
'returned to this program, where the 'menu is displayed.

first:
  SHELL "1.bat"
RETURN
'
second:
  SHELL "2.bat"
RETURN
'
third:
  SHELL "3.bat"
RETURN
'
fourth:
  SHELL "4.bat"
RETURN
```

```
'
fifth:
   SHELL "5.bat"
RETURN
'
sixth:
   SHELL "6.bat"
RETURN
'
seventh:
   SHELL "7.bat"
RETURN
'
'
BooBoo
     LOCATE j+12,8
     GOSUB Delay
     PRINT "That was an invalid response. Please press any key to continue."
     WHILE INKEY$="":WEND
     GOTO printmenu
'end of BooBoo
'
'
Delay:
     FOR t=1 TO hold
     NEXT t
RETURN
'
LogOut:
PRINT
PRINT
PRINT "You have asked to log off the system."
PRINT
PRINT "Type Y to logoff or any other key to return to the menu";
GOSUB GetKey
IF choice$="Y" THEN
     'call logout sequence
     REM SHELL "f:\awhost\awlogoff a:>nul"
     SHELL "C:\CLOSEUP\CUSTS HANGUP A:>nul"
     END
ELSE
```

```
    GOTO printmenu
END IF
'
'
GetKey:
    choice$=""
    WHILE choice$="":choice$=INKEY$:WEND
    choice$=UCASE$(choice$)
RETURN
'
'
NOFILE:
RESUME NOMESS '
'
```

Appendix C

Removing Extraneous Carriage Returns

Procedures for Removing Extra Carriage Returns

A carriage return is a character that is generated each time the Enter key is pressed on the keyboard. When saving information from the CD-ROM, a carriage return is inserted at the end of every line of text. This is not a major problem if the file is printed in the same size print the file contains, but if the information is enlarged or translated into braille, the length of the lines is critical. If the carriage returns are not removed, the printed file will contain one line of normal length, followed by one short line. In addition to using a lot of additional paper, the extra carriage returns make the original file harder to read and edit. That is why it is necessary for the student to have some easy method for removing these extra carriage returns. Some possible methods for achieving this include:

1. Some word processors have a feature that will analyze the file and attempt to remove the extra carriage returns automatically. Be aware that some programs will remove ALL the carriage returns, which makes the material just as difficult to read or edit.
2. Some word processors support macros which can be used to remove the carriage returns from within selected paragraphs. The macros usually require that a single paragraph be selected before activating the macro.
3. Special programs called reformatters can be used. These programs are usually public domain or shareware. This enables you to try them out before purchasing. Shareware programs can be found in a variety of places including local bulletin board systems and commercial online systems such as CompuServe or America Online. RDI staff found that these types of programs do a better job at removing the extra carriage returns then do either of the other two methods listed above.

Appendix D

Equipment and Software Used in Project CD-VisROM

CD-VisROM Equipment and Software

Following is a comprehensive list of the equipment and software which the students in Project CD-VisROM used.

Off-the-shelf Equipment and Software

Toshiba laptop computers
Hewlett Packard portable printers
MegaHertz internal modems
WordPerfect word processing software
Close-Up telecommunications software

All of the equipment and software listed above can be purchased from local computer dealers or from mail order firms.

Adaptive Equipment and Software

Transport speech synthesizer
Artic Technologies
55 Park Street
Troy, MI 48083
(810) 588-7370

Braille Blazer portable braille printer
Blazie Engineering
105 E. Jarrettsville Road
Forest Hills, MD 21050
(410) 893-9333

Vocal Eyes screen reader software
GW Micro
310 Racquet Drive
Fort Wayne, IN 46825
(219) 483-3625

Zoomtext screen enlargement software
AI^2
P.O. Box 669
Manchester Center, VT 05255-0669
(802) 362-3612

MegaDots braille translation software
Raised Dot Computing
408 S. Baldwin
Madison, WI 53703
(608) 257-9595

Appendix E

Specific Components of the CD-VisROM Training Program

The topics listed in this Appendix appear in the order they were covered during the summer training session for teachers. The following list and time table are only recommendations. The topics and the amount of time required will vary according to the amount of computer expertise the teachers may already have.

Training Time Table

DAY 1

Introductions and Preliminary Information
Introduction to the Computer and Printer
Using the Word Processor

DAY 2

Using the Modem and Remote Control Software
Using the CD-ROM System
Accessing the CD-ROM
Logging off the CD-ROM System

DAY 3

Using Each CD-ROM Application
Saving Articles From the CD-ROM to an Individual's Computer

DAY 4

Adaptive Computer Training

NOTE: At this point, the teachers were divided into two groups according to the types of adaptive equipment required by the students. While one group was learning to use each piece of adaptive equipment, the other group was practicing the use of the CD-ROM system.

DAY 5

Adaptive Computer Training
Wrap-up

Specific Training Topics

Computer Related Topics

Orientation to the Computer

Connecting Devices
The Keyboard
Turning the Computer On
Running Application Software
Computer Care
The Menu[1]
Word Processor
Braille Translator[2]
Setting Speech Options[2]
Viewing Files
Cleaning File Options[3]
Setting Date and Setting Time
DOS Tutorial

[1]Since a DOS-based system was used, each computer was equipped with a menu that made it easier for the students to access the various programs which were used. If Windows or the MacIntosh is used, training on using those systems should be provided.

[2]These items appeared on the computers of the students that required speech and/or braille access programs.

[3]The Clean Files Options were used to remove the extra carriage returns within a file saved from a CD-ROM. Each CD selected had a separate option on the menu. This ensured that the files from each CD-ROM application were properly "cleaned." A procedure for removing these extra carriage returns is provided in Appendix G.

Orientation to the Print Printer

Plugging the Printer In
Connecting the Printer Cable
Turning the Printer On
Paper Handling
Changing the Print Cartridge

Introduction to the Word Processor

Starting the Word Processor
Word Processor Commands
Exiting the Word Processor
Getting Help
Cursor Movement Commands
Editing Commands
Format Commands
Page Format Commands

Blocking Procedures
Saving Your File on Disk
Retrieving a Saved Word Processor File
Retrieving a Saved CD-ROM File
Spell Checking
Printing a Document
Setting the Default Font Size and Type
Changing Fonts from Withia a Document
Using Speech with the Word Processor

Using Telecommunications

Using the Modem
Calling the CD ROM System
Logging onto the System
Changing Your Password
Hanging up from the System
Exiting the Remote Control Program
Adding Phone Numbers to the Remote Control Program's Phonebook
Proper Settings for the Remote Control Program

The CD-ROM Software[4]

Introduction (including the type of material available for each CD-ROM)
Starting the Database
Exiting the Database
Getting Help
Screen Layout
Using the Database
Searching the Database
    The Different Types of Searches Available
    Entering Search Terms
    Wild Cards and Truncation
    Entering Multiple Search Terms
Activating the Search
The Article Title Screen[5]
Moving Within the Article Title Screen
Selecting an Article to Browse
Reading an Article
Article Layout
Moving Within the Article

Searching Within the Article
Moving to Other Articles
Saving Information to Your Computer

[4]Each CD-ROM was covered in detail. Since the topics covered are very specific to that piece of software, the topics listed have been written in general terms.

[5]After the CD-ROM has been searched, a list of article titles that contain the desired information will appear. The article is chosen from this list.

Using The Screen Enlargement Program[6]

Turning the Screen Enlargement On/Off
Screen Enlargement Program Commands
- Changing the Enlargement Size
- Setting the Enlargement Type
- Deciding Which Screen Activities to Track
- Saving the Settings
- Keyboard Commands for Controlling the Program

[6]The teachers with low vision students participated in this section of the training workshop.

Using the Braille Printer and Translator

Using the Braille Printer
Loading the Paper
Connecting to the Computer
Braille Translator Description
Starting the Braille Translator
Exiting the Braille Translator
Screen Layout
Retrieving a Word Processor File
Translating a File into Braille
Formatting a File for Braille
Saving a File in Braille Format
Brailling a File
Editing Commands
Cursor Movement Commands
Using Speech with the Translator
Translator Options

Speech Hardware and Software[7]

Synthesizer Orientation
Connecting the Synthesizer to the Computer
Using the Screen Reading Software
Reading Commands
Hot Key Commands
Cursor Key Commands
Automatic Reading
Adjusting the Speech Settings
    Screen Settings
    Keyboard Settings
    Voice Settings
    General Settings
    Saving and Loading
Getting Help
Reviewing Mode Commands
Speech Commands Used with the Other Software in the System
Word Processor
View Files
Braille Translator
Remote Control
CD-ROM Applications

[7]The teachers with blind or severely low vision students participated in this section of the training workshop.

Appendix F

Teacher and
Student Logs

Teacher Log—Training Phase

Teacher _____ **Student** _____ **Date** _____

Type of training provided:

Time taken for training:

Progress made:

Difficulties encountered or special attention needed (e.g. logistic difficulties involving scheduling or busy lines, difficulties with equipment, amount of encouragement or reinforcement needed, working with classroom teacher, etc.):

Teacher Log—Training Phase

Instructions

The purpose of this form is to detail the amount and type of training which you provided for your student in the CD-VisROM Project. Please follow these instructions in completing the form. A separate form should be completed for each training session.

Type of training provided: Briefly describe the training you provided during this session. Examples might include the fundamentals of use of the computer (plugging in the equipment or making adjustments or familiarizing to the equipment), or WordPerfect (creating a file and saving it), or Vocal Eyes (use of the speech cursor), using the printer, logging on to the CD files, etc.

Time taken for training: Estimate the number of minutes and/or hours that were spent in this training session.

Difficulties encountered or special attention needed: Briefly describe any problems which you may have encountered during the training session. If you have found a solution, or "a way around the problem," describe that also. If you encountered no problems, just write "no difficulties." Please also describe your periodic interactions with your student's classroom teachers regarding the student's use of the CD-ROM equipment for their assignments.

STUDENT LOG—CD-ROM USE

Name _____ **Date** _____

Purpose of Search (class assignment, research paper, extra-curricular activity, etc.)

Topic of Search _____

Names of sources searched _____

_____

Amount/length of information retrieved _____

_____

Time taken for search _____

Difficulties encountered during search _____

_____

Methods for overcoming difficulties _____

_____

Equipment and Software Used

____ computer ____ Transport and Vocal Eyes ____ Zoomtext
____ Print printer ____braille printer other methods used, if any (magnifiers, readers, tapes, braille resources, etc.):

Assistance

what kind of help was needed?_____

got assistance from ___teacher ___parent ___RDI staff ___other?

time required for assistance _____

Student Comments _____

_____

Teacher Comments _____

_____ Initial _____

Student Log—CD-ROM Use

Instructions

Follow these instructions for completing the student log for doing information searches when using the CD-ROM system.

Name: Write your first and last name.
Date: Write the day, month, and year when the search took place. Fill out a form for each search you did. If more than one search was needed on the same topic over several days, fill out a form for each separate day.

Purpose of Search (class assignment, research paper, extracurricular activity, personal use, etc.): If your teacher made an assignment to look up information about a certain topic, underline or write "class assignment" and name the class. If it is a longer assignment in which you are required to get a lot of information and write a paper or give a speech, underline or write "research paper" and name the class. If you got information for an extracurricular activity such as the speech team or a science club, underline or write "extracurricular activity" and name the activity. If you searched for information just for your own personal interest and use, underline or write "personal use."

Topic of Search: Name the topic of the search (for example, War of 1812, Einstein, downfall of Communism, etc.).

Names of sources searched: List names of the CD-ROM files which you used in your search (for example, MicroSoft Bookshelf, Grolier Encyclopedia, News Digest, certain magazine articles, etc.).

Amount/length of material retrieved: Make an estimate of the number of screens of information that you actually retrieved and read.

Time taken for the search: Estimate the number of minutes that you spent in getting information (how long did it take from beginning to end?) Do not count the amount of time that it took for you to actually study the material.

Difficulties encountered during the search: Give a brief statement describing any problems you might have had in carrying out the search (for example, not being able to "get into the system" right away, or the line was busy when you tried, or you did not understand how to use the system well enough to download the information, or the speech was confusing, etc.). If you did not have any difficulties, then write "no difficulties."

Methods for overcoming the difficulties (if any): If you had some difficulties and you were able to solve them, give a brief description of how you did that (for example, you might have asked your teacher how to solve the problem you were having, etc.).

Equipment and/or software used: Check the appropriate items to indicate which software and hardware you used. You can check more than one item. If you used something that was not listed (like a magnifier), check other and name the item.

Assistance

What kind of help did you need, if any? Maybe you needed assistance in logging onto the CD-ROM terminal, or using the printers, or the speech output. Briefly describe the kind of help you needed.

Got assistance from: Check the source of help you received. If you received help from someone not listed, check "other" and write the kind of person that helped.

Time required for assistance: Estimate the amount of minutes and/or hours that the person helped you. If the person helped you with the entire search, this may be the same amount of time required to complete the search (as you answered above).

Student comments: If you have any additional comments to make about anything having to do with this search, please write them here (and you can also write on the back of this page if you need more space). Make certain that you give this log to your teacher when you are supposed to.

Teacher comments: Your teacher may add comments and sign his or her initials after receiving the log from you. Your teacher will then give these logs to the RDI researchers.

Appendix G

Sample Lesson Plans
for Low Vision Students

SAMPLE LESSON PLAN

Lesson One—Introduction to CD-VisROM

Discuss Program and how system works.

1. Introduction to computer hardware
   - ports
   - cables
   - battery charging procedures - length of charge
   - modem - what it is
2. Introduction to printer
   - hardware and selection buttons
   - set up procedures
   - loading paper
   - installation of print cartridge
3. Introduce screen enlargement software
   - menu
   - changing characteristics
   - program features
   - program operation
4. Check student's ability to
   - turn on/off independently
   - connect/disconnect cables independently
   - type/print documents
   - saving/naming files

Assignment:

Student encouraged to practice setting up, typing and printing documents and saving files. Use with school work as well as personal items for practice. Save practice items for review at next lesson. Make notes of any difficulties.

SAMPLE LESSON PLAN

Lesson Two—Introduction to Screen Enlargement Software and Notebook Computer/Printer Review

1. Screen Enlargement Software options (Quick Reference #1)*
2. Calling into remote system, and logging in - introduce and review steps (Quick Reference #2 and #3)
3. Give student Quick Reference #1
4. Review practice materials that student has worked on.
5. Practice printing
   A. a screen (Quick Reference #6)
   B. selected text (Quick Reference #7)
   C. remind student that Quick Reference #8 tells how to activate the print spooler and Quick Reference #4 gives steps to Logoff.

Assignment

1. Experiment with Screen Enlargement Program. Try a variety of menu options to develop the screens that student likes the best. List all the settings for two options student likes best. Turn these in to teacher and be prepared to demonstrate how they work.
2. Try logging into/out of the RDI system twice.
3. Perform a word search in Grolier's Encyclopedia. Gather information on DNA, eyes, or crocheting. Attempt to copy either the screen or the entire article into the print spooler. DO NOT get discouraged if you run into problems. The system will take some time to learn. Be certain to write down CD-ROM Use and note the difficulties you encounter EACH TIME YOU USE THE SYSTEM. Call teacher if you need to ask for assistance.

*Quick Reference sheets are included in Appendix G.

MONTHLY LESSON PLAN

Lesson Three—Introduction to Grolier's Encyclopedia
Options Timeline/Knowledge Tree

Check student notes and discuss any difficulties or problems encountered.

1. Collect homework. Demonstrate how two screen enlargement choices work. Was student more successful in downloading the files?
2. Call RDI (Quick Reference #2) and login. Set up the print spooler (Quick Reference #8) for WWII.

   Select word search - WWII
   Demonstrate how to place different words on each line.
   Copy only the information on Nazi concentration camps or find it in some other way.
   Print a selected text (Quick Reference #7) Santa Fe Trail or Abscam
3. Introduce Timeline option.

   Look up events in 1952 - Highlight one and go into articles.
   Set up spooler and copy files.
   What major event happened in 60 B.C.?
4. Introduce the Knowledge Tree option +/- indicators.

   Select the Arts - performing arts, theater/circus mime and pantomime/mime and pantomime performers. Answer these questions: When was Marcel Marceau born? What was his most famous stage personality?
5. Using the tree, select entries to get to the Sierra Madre Mountains.

   List what "Sierra Madre" means. (Mother Range)
   How much of Mexico does it occupy? (75%)
   What does Geronimo have to do with the Sierra Madres? (Had a secret camp there in 1881.)
6. Exit and logoff.
7. Retrieve and print files.
8. Hand out Quick References #2,3,4,5,9 for Timeline and Knowledge Tree options, and homework.

CD-VisROM ASSIGNMENT

Grolier's Encyclopedia

1. Using the Knowledge Tree, choose science, then life science, genetics and heredity, and then heredity. What are the two selections under this?

   a._____ b._____ Can you go deeper?_____

   Scroll through the article to fill in this blank: The most significant event in the history of biological science is Darwin's theory of _____.

   Who's laws are listed as the next major entry under Darwin? _____

   _____

   How many pages of information are there under the **heredity** entry? _____

   ___ _____ _____

2. Go into **technology** and then **general topics.** List each further level you can choose from.

   _____

   _____

   _____

3. Can you think of a time when you might use the Knowledge Tree rather than a direct word search?

   _____

   _____

4. Using the TimeLine, list 2 events that happened in 1980.

   _____

   _____

5. How many entries were listed for 1980? _____
6. What famous swimmer won 7 gold medals in 1992?_____
7. Who succeeded Gamal Abdel Nassar as Egyptian President in 1970?

   ___ _____

8. What year was Jesus Christ born? (Hint: Search 20 BC to 20 AD)

   _____

9. What is the most recent year of the time line? _____

   Is Michael Jordan mentioned? _____ Why? _____

   _____

Using your choice of Word Search, Timeline, or the Knowledge Tree, write a short report on one of these events from 1980: Love Canal or Solidarity. Include a copy of your downloaded files. Were you able to copy only the article portions you wanted? What difficulties did you have?

CD-VisROM ASSIGNMENT

Magazine Article Summaries

1. Complete the Magazine Article Summary (M.A.S.) tutorial.
2. How many magazines does this CD include?
3. Use the M.A.S. CD to help you in your assigned school report. Be ready to show me what information the CD was able to contribute to your overall project.

Monthly Lesson Plan

Lesson Four—Introduction to Microsoft Bookshelf

Collect homework.

1. Microsoft Bookshelf is composed of 6 references: Concise Columbia Quotations, Bartlett's Familiar Quotations, American Heritage Dictionary, Roget's Electronic Thesaurus, Concise Columbia Encyclopedia, and the World Almanac 1991.

   What type of information might be searched for in an almanac? Thesaurus? Book of Quotes?

2. Logon and enter Bookshelf.
   Discuss Main Menu Bar at the top of the screen.
   Access by keying in first letter or shortcut commands.

   Columbia Quotations - Alt C
   American Heritage Dictionary - Alt D
   Roget's Thesaurus - Alt E
   Bartlett's Quotations - Alt F
   World Almanac - Alt W
   Columbia Encyclopedia - Alt Y

3. Access the Encyclopedia

   Discuss moving around in the dialog boxes
   Tab goes to next item in box
   Shift Tab moves to the previous dialog item
   Enter selects an option in the list box/carries out default.
   Esc cancels a command/closes dialog box.
   Discuss search terms
   Single words (search must find BOTH words), phrases, or two words separated by a comma (interpreted as "or").
   Discuss "Match Words In" options.
   Review this new material verbally.
   Key in Valentines Day.
   How many entries?
   Select St. Valentine's Day
   Discuss new Menu Bar, Browser Menu Bar, Next & Previous
   Select N and notice that next disappears when no longer an option.
   Select P until you are at initial article. Notice your search word is highlighted.
   What did Chaucer have to do with Valentine's Day?

Homework Exercises for Microsoft Bookshelf

Lesson Four

1. Select Microsoft Bookshelf from the main menu.
   Select quotations from the menu bar. (Q)
   Select both books from drop down menu. (Use cursor movement keys--enter)
   Type in Sir Winston Churchill in the Search Dialog box.
   In the Match Words In Box, select book. (Remember to use the tab key to move from box to box.)
   Begin search.
   In the space below, copy the quote you find first.

   _____

   _____

   _____

2. Select next from the browser bar menu. (Hit "N" enter)
   Copy the quote you find.

   _____

   _____

3. Return to the search screen ("S" enter).
   Search the box and list the number of occurrences found during the previous search. _____

4. Type this quote in the search dialog boxes: "Appearances often are deceiving."
   Choose the author/date box to locate the author and the piece of literature the quote is from. List that information in the space provided: _____

   _____

5. Return to the Main Menu Bar (ESC)
   Select definition (D) and American Heritage Dictionary (Use cursor movement key and enter).
   Type "subtle" in the quick reference dialog box. Copy the definition.

   _____

   _____

   Return to the definition menu (D) and select Roget's Thesaurus (Use cursor movement keys - enter or Alt E.)
   Find a synonym for "subtle." Copy the last word found in the list.

   _____

   Put the cursor on the last word or its cross reference symbol and press enter.
   Copy the first and last word listed as synonyms. _____

6. How do you exit Bookshelf?_____

7. List the books contained in Bookshelf. (Hint: Select all pull down menus from the Main Menu Bar.)

   _____

   _____

   _____

8. List the setting that controls the scrolling feature when using Zoomtext.

   _____

   Retrieve any file and display on the monitor. Try several review menu options. Which option did you like best?

   _____

Be prepared to show me how it works.

Monthly Lesson Plan

Lesson Five—Search Activities on Microsoft Bookshelf

1. Logon to MS Bookshelf
2. Enter **Facts** and **Almanac**
3. Locate the answers to these questions - discuss the browser bar.
   a. Who won the academy award in 1985 - Best Movie? (Academy Awards section - find)
   b. What are the top 10 best selling magazines in the U.S.? (Magazines - section - 100 best selling) What # is Newsweek?
   c. Look up genetics and copy the paragraphs. Discuss different copying procedures.
   d. Name two inventions from 1990 (inventions/paragraph). Try "next" which goes to a string of inventions. Go to "S" for search and "F" (find) to find the inventors of velcro and television (cd do p up).
   e. What is the average height and weight for a 5 year old girl/boy? (Height/weight/paragraph).
   f. Browse T of C for disasters (search/find/tornadoes). What year did the US have the greatest # of deaths from a single earthquake?
   g. What are major stresses in one's life?
4. Hand out copy of the almanac index.
5. Student should independently use Bookshelf to answer these questions.
   a. Name 3 categories of diseases (facts/ency/diseases).
   b. Def of obscure and synonyms - use ref mark to find more.
   c. Who said "Give me liberty?"
   d. Find some of Franklin's quotes. Find where "The cat in gloves catches no mice" came from.
6. Any questions on Bookshelf?
7. Check to see if file was copied - use new procedures.

Monthly Lesson Plan

Lesson Six—Introduction to Facts on File News Digest

1. Collect homework. Note any problematic areas.
2. Introduce Facts on File -

   It is a data base
   Covers 1984 to the present
   It is a news digest
   Would be useful for current events

3. Go into the database
   a. Type **pyramids** and F2
      Select 5 from the list - Does it tell about the Egyptian pyramids?
      Change the search - F3
      Type in **Egyptian** - Page down to see the next 4 lists
      Browse #5 (Place cursor there and press enter).
      What date is the article? (March 7, 1986)
      Draw attention to the fact that even though maps are listed as an option, don't select since graphics are difficult to send over the phone.
   b. Look up **mass and murder**
      Look up #14 - Where did this occur? (Killeen TX, Luby's Cafeteria)
      What date? (October 17, 1991)
      Hit ESC to return to the result list.
      Alpha-position to #17. Who was Charles Garry?
   c. Discuss using two words on line A or a second word on B if the search is to be narrowed.
      Discuss wild cards and truncation. Discuss the Limit by dates column and how to manipulate.
   d. Enter the index to browse - F7
      Use the cursor keys, pg up/dn, home and end to scroll through the Index. Use alpha-positioning to go directly to a selected area of the Index. Select something to investigate.
      Press F2 on the article description to go directly to that article. Use ALT P or ALT N if the article is not displayed.
      To return to the index press ESC.
   e. Exit CD and logoff. Bring files into WordPerfect and print.

CD-ROM Assignment

Facts on Files News Digest

1. Complete the tutorial. Working in this CD is more complex than the other CDs we've been in, so expect that this should take you a couple of hours. Complete in two or more phone calls, since you are limited to 60 minute access times!

2. Answer these questions using information from the tutorial or manual.

   What years does Facts on Files cover? _____

   How many entries are included? _____

   What key is pressed to get help? _____

   What is another name for the Search Screen? _____

   How do you exit the Help system? _____

   How do you exit the program? _____

   How do you access the Search Screen? _____

   How do you start the search from the logon screen? _____

   _____

   How do you narrow your search? _____

   What does the ? and re?d stand for? _____

   What is the result list? _____

   What information is listed in the result list? _____

   What key do you press to see the article at the cursor? _____

   At the result list, what keys could you press to browse the previous/next article?

   _____

   When viewing an article, what key takes you to the result list so that you can browse other search results? _____

   How are the + and - keys used? _____

   What key will move the cursor to the next "see reference"? _____

3. Select one entry from the Index. Copy and print out one complete article from the search list. Block mark and print one section. Note any problematic areas.

Appendix H

Sample Quick Reference Sheets

1. *Zoomtext*

To view only one line at a time in large print at three times the standard magnification, select the following menu choices EACH TIME YOU ENTER ZOOMTEXT.

ZOOM (line)
MAGNIFICATION (3x)
TRACK (cursor and highlight)
JUSTIFICATION (jump and window)

With these settings ALT-END will move the cursor 1/3 each time it is pressed. When you get to the end of a line and wish to continue reading, press down arrow key and repeat the ALT-END sequences until the end of the current line. Remember to use the arrow keys to move the cursor location and the ALT–END to scroll.

ALT-DEL will turn off Zoomtext. This must be done initially to use the modem.

ALT-INS will turn Zoomtext on or a second ALT-INS will bring up the menu selections.

Try this setting:

ZOOM (area)
MAGNIFICATION (4x)
WINDOW (scroll
frame
port
wrap)
REVIEW (begin)
FONTS (PC)
TRACK (cursor)
JUSTIFICATION (jump
window)

2. *Calling R.D.I.*

1. Plug the communication cable into the modem port and phonejack.
2. Select "Call RDI" from Main Menu. The Close-up screen will appear.
3. Highlight PHONE. (Use the right/left cursor arrow keys as needed.) You may set up the "Print Spooler" (Select PRINT AT Print Spooler. Name your file in box, press Enter.)
4. Highlight DIAL by using the down arrow key. Press Enter.
5. Turn off Zoomtext, if it is presently in use.
6. Highlight RDI by using the down arrow key. Press Enter.

PLEASE NOTE : If you have call-waiting, it must be disconnected before pressing ENTER. If you plug the communication cable into a 2-for-1 modular Jack Adapter, thus allowing the phone to remain connected, you can highlight "Call RDI," lift up the phone, punch in *70, listen for second dial tone, quickly press ENTER on the computer, and immediately hang up the phone -- and the task is accomplished.

7. You will hear the carrier signal if a connection is being made. You will be prompted to press ENTER to continue. The RDI screen should appear.

3. *Logging Onto the RDI System*

Once a communication connection has been made and you have pressed ENTER as prompted, you will see the CD-ROM screen.

1. Enter your login name and press ENTER.
2. Enter your password. DO NOT share this with anyone! (but you may want to write it down somewhere, in case you should forget it.)
3. Check the screen for information and messages. Press any key to continue.
4. The RDI Main Menu will appear and you are ready to begin your CD-ROM search.

4. *Steps for Groliers, Including Logging Off*

1. Select Groliers Encyclopedia from the main menu.
2. Once Groliers screen appears, press ENTER to continue, or Alt Q to quit.
3. Highlight word search and press ENTER.
4. Type in the word to begin the search (and as needed any other related words) and enter a number of times until VIEW TITLES appears.
5. Press ENTER.
6. An article title screen will appear. Highlight the area you would like to view using the arrow keys. Press ENTER.
7. The article will come up on the screen. Use ALT-Z to fill the entire page with print if you like large print but are not in Zoomtext. The number in the top right will tell you what page you're on out of a total number of pages.
8. Read what you want using the arrow keys to move through the article or download the files to read later--if you choose this, be certain you have set up the print spooler!
9. Once you're done, follow the directions in the downloading files section to save your information. Press ESC.
10. To quit, press ALT-F, then ALT-Q to return to the Groliers screen.
11. You are at the main menu. You may select another item or press L to logoff. If logging off, press Y to confirm.
12. To get out of the Close Up screen, press ESC again to get back to the main menu.
13. If you are reading to view your files or print them, follow the steps on the "retrieving files" sheet (Quick Reference #9)

5. *Helps for Using Groliers Encyclopedia*

ALT-Z changes the size of the screen to make the text fill up the entire screen. **ALT-Z** a second time will return the screen to its original size.

Page up and **Page down** allow you to read all the information in an article one page at a time.

ALT-P is used to print (really download your files onto the hard drive). Once on the menu, select **All** on the window, and then select **Begin**.

ALT-M begins highlighting a block of text for saving or printing. Move the cursor to extend the marked selection. Report **ALT-M** to unmark the selection.

ALT-Q will allow you to return to the title screen from any point in the program. Once there, press **ALT-Q** again to return to RDI main menu.

Logoff at the Close-up screen by typing in a letter "**L**".

6. *Downloading Files from the CD-ROMs*

Note: The Print Spooler must be set up previous to downloading files.

Printing a Complete Article

1. The desired article must be on the screen.
2. Press **ALT-P** to bring up the print options box. The words "Begin Print" should be highlighted.
3. Press the down arrow until **ALL** is highlighted. Press ENTER.
4. Press the up arrow to highlight **BEGIN PRINT.** Press ENTER.
5. A print status box will appear toward the bottom right of the screen. It will indicate when the printing is completed. This may take up to several minutes depending on the length of your article. Press escape to return to the article.

Printing the Screen

Note: The print spooler must have been set up previously.

1. Press **ALT-P** to get into the print options menu.
2. Place the dot before the word "Window" by using the down arrow key until it is highlighted. Press ENTER.
3. Using the up arrow key, highlight "Begin Print." Press ENTER.
4. Watch the screen to inform you when printing is complete. Press ESC.

7. *Printing Selected Text*

Note: The print spooler must have been set up previously.

1. Place the cursor at the beginning of the material to be selected. Press **ALT-M**.
2. Use the cursor movement keys to highlight the selected text.
3. Press **ALT-P** to bring up the print options screen.
4. Use the down arrow key to highlight "Selection." Press ENTER.
5. Press the up arrow key to highlight "Begin Print." Press ENTER.
6. Watch the screen to inform you when printing is complete. Press ESC until the article is in view.

8. *Print Spooler*

The print spooler must be set each time information is to be saved from any of the CD-ROMs.

1. After you have selected "call RDI" on the menu, the Close-up menu will appear. Preferably before phoning, but really any time you are in the CD-ROM system, you need to activate the spooler from the Close-up menu. (If you need to get back to the Close-up menu, press CONTROL-C.) Using the l/r arrow keys, highlight PRINT.
2. At PRINT AT select support spooler by pressing ENTER a number of times until the name appears.
3. At name prompt, type in the name of your file. (This should reflect the topic of your search--using 8 characters or less.)
4. If you have not yet begun your search, move l/r cursor to highlight phone.

9. *Retrieving Files*

After you have completed your CD-ROM searches, saved the information in the print spooler, and logged off the system, you will need to retrieve the information.

1. Select WordPerfect from the main menu.
2. Press Control F5 (text in/out).
3. Choose the option DOS text.#1.
4. Select option #3 (retrieve file).
5. Name the file, including the path. Example: c:\closeup\ (name placed in print spooler.)
6. The file should appear on the screen. You may choose to print it by using the F7 command or read and/or edit it from the screen.

Appendix I

Sources of CD-ROMs

The following resources were obtained from an FAQ on the Internet.

To begin, there are four very large directories of CD-ROM databases:

The CD-ROM directory (TFPL, semi-annual, in print and on CD-ROM)
CD-ROM Finder (Learned Information, annual)
CD-ROMs in Print (Meckler, annual, in print and on CD-ROM)
Gale Directory of Databases, Vol 2 (Gale, semi-annual; Vol 1 covers online databases)

R.R. Bowker
121 Chanlon Rd.
New Providence, NJ 07974
(800) 521-8110

CD PLUS
333 Seventh Ave.
New York, NY 10001
(212) 563-3006; (800) 950-2035
Internet: cdplus@cdplus.com (general information)
support@cdplus.com (technical support)
Suggest@cdplus.com (suggestion box)

Compact Cambridge
7200 Wisconsin Ave.
Bethesda, MD 20814
(301) 961-6737

Dialog Information Services, Inc.
3460 Hillview Ave.
Palo Alto, CA 94304
(415) 858-3785; (800) 334-2564

EBSCO Publishing
83 Pine St.
Peabody, MA 01960
(800) 653-2726; (508) 535-8545
epQebsco.com

Gale Research Inc.
835 Penobscot Building
Detroit, MI 48226
(313) 961-2242

Newsbank/Readex
58 Pine Street
New Canaan, CT 06840
(203) 966-1100; (800) 243-7694

SilverPlatter Information Inc.
100 River Ridge Dr.
Norwood, MA 02062
(617) 769-2599
Internet: info@silverplatter.com
support@silverplatter.com

University Microfilms International (UMI)
300 North Zeeb Rd.
Ann Arbor, MI 48106
(313) 761-4700; (800) 521-0600

H.W. Wilson Company
950 University Ave.
Bronx, NY 10452
(718) 588-8400; (800) 367-6770

WLN
PO Box 3888
Lacey, WA 98503-0888
(206) 923-4000; (800) 342-5956

The following resources were obtained from: Parker, D. & Starrett, B. (1992). *Technology edge: A guide to CD-ROM.* Carmel, IN: New Riders Publishing.

CD-ROM, Inc.
1667 Cole Blvd., Suite 400
Golden, CO 80401
(303) 231-9373
(303) 231-9581 (Fax)

New Media Source
3830 Valley Centre Drive
San Diego, CA 92130-9834
(800) 344-2621
(619) 793-4823 (Fax)

New Media Schoolhouse
Market Plaza Building
Box 390 Westchester Avenue
Pound Ridge, NY 10576
(800) 672-6002
(914) 764-0104 (Fax)

Peter J. Phethean, Ltd.
1640 E. Brookdale Avenue
LaHabra, CA 90631
(714) 990-5524
(714) 990-0137 (Fax)

Softec Plus
1200 East River Road
Tuscon, AZ 85718
(800) 779-1991
(602) 882-4930

Update CD-ROM
1736 Westwood Blvd.
Los Angeles, CA 90024
(800) 882-2844
(602) 888-4930

The following resources were obtained from: Croft, D., Kendrick, D., & Gayzagian, A. (1994). *The CD-ROM advantage for blind users.* Boston, MA: National Braille Press, Inc.

Appleton & Lange
25 Van Zant Street
Norwalk, CT 06855
(800) 423-1359

Automation Office
NLS/BPH
Library of Congress
1291 Taylor Street, NW
Washington, DC 20542
(202) 707-9314

Chicano Studies Library
University of California at Berkeley
3404 Dwinelle Hall
Berkeley, CA 94720
(415) 642-3859

Crazy Bob's
50 New Salem Street
Wakefield, MA 01880
(617) 246-6767

Creative Labs, Inc.
1901 McCarthy Blvd.
Milpitas, CA 95035
(408) 428-6600; (800) 998-5227

Creative Multimedia Corporation
513 NW 13th Avenue, Suite 400
Portland, OR 97209
(503) 241-4351

DAK Industries, Inc.
8200 Remmet Avenue
Canoga Park, CA 91304
(800) 325-0800

Eight-Bit Books
462 Danbury Road
Wilton, CT 06897-2126
(203) 761-1466; (800) 248-8466

HyperGlot Software
PO Box 10746
Knoxville, TN 37939-0746
(800) 726-5087; (615) 558-8270

Knowledge Media
436 Nunneley, Suite B
Paradise, CA 95969
(916) 872-7487

Media Vision
47300 Bayside Parkway
Fremont, CA 94538
(510) 770-8600; (800) 845-5870

ProSys
1801 Royal Lane, Suite 608
Dallas, TX 75229
(800) 645-7405; (214) 556-2421

Software Dispatch
1 Infinite Loop
Mailstop 30345
Cupertino, CA 95014
(408) 862-7000

Software Toolworks
60 Leveroni Court
Novato, CA 94949
(415) 883-3000; (800) 234-3088

Starvector Software
PO Box 11176
Yakima, WA 98909
(509) 457-2892; (800) 801-7667

TestDrive Corporation
2933 Bunker Hill Lane
Suite 101
Santa Clara, CA 95054-1124
(800) 788-8055

TigerSoftware
One Datran Center
9100 S. Dadeland Blvd.
Suite 1500
Miami, FL 33156
(800) 888-4437

World Library, Inc.
2809 Main Street
Irvine, CA 92714
(800) 443-0238

Appendix J

Sources of Information Dealing with CD-ROM and Local Area Network Technology

For additional information about CD-ROM and local area network technology, the reader is referred to the following resources on the Internet.

A complete version of a Frequently Asked Questions (FAQ) file for CDROM-LAN@IDBSU.IDBSU.EDU will be distributed the fifth working day of each month. If you subscribe to the list, you will receive the update as part of your regular list traffic.

The FAQ is also available via mail-server at (GESS@KNEX.MIND.ORG.). To order it from the mail-server, send the following command to: MAIL-SERV-ER@KNEX.MIND.ORG. leaving the subject blank.

SEND CDPUB/FAZ/CDROMLAN.FAQ

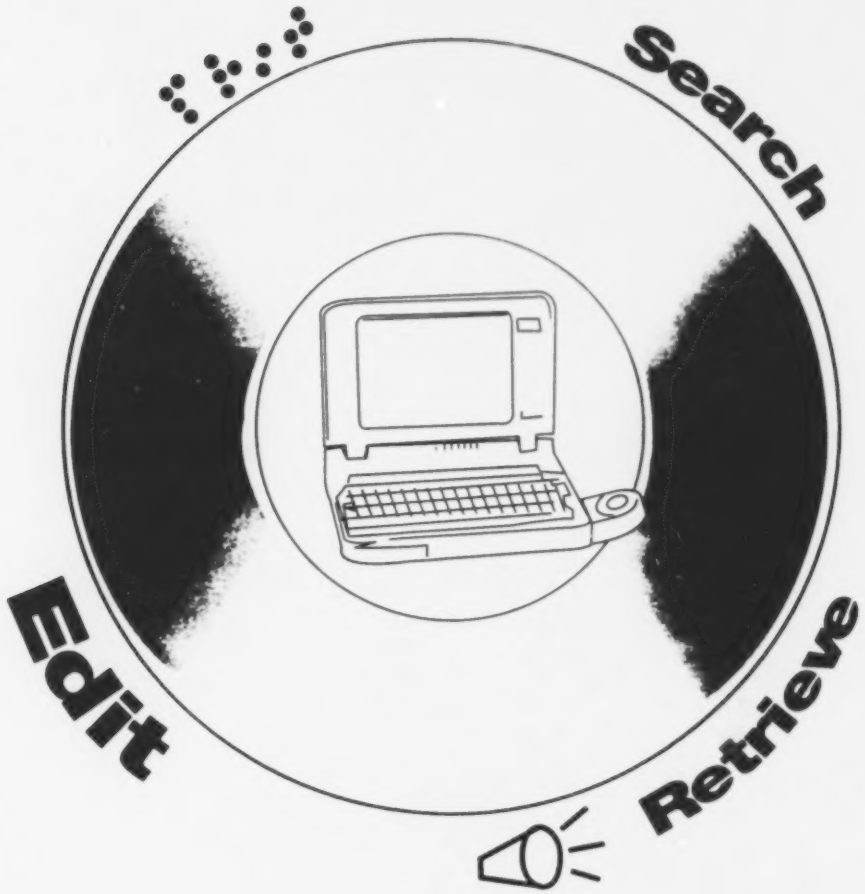
The CD-ROM LAN FAQ is also available at WWW at HTTP://CYCLOPS.ID-BSU.EDU

Additionally, articles dealing with CD-ROM and local area networking can occasionally be found in the following magazines:

Byte	LAN Times
CD-ROM	Professional Online
ComputerWorld	PC Magazine
InfoWorld	PC World

Project CD-VisROM

Remote Access to CD-ROM by Visually Impaired Students



Gaylen Kapperman
Steve Hahn

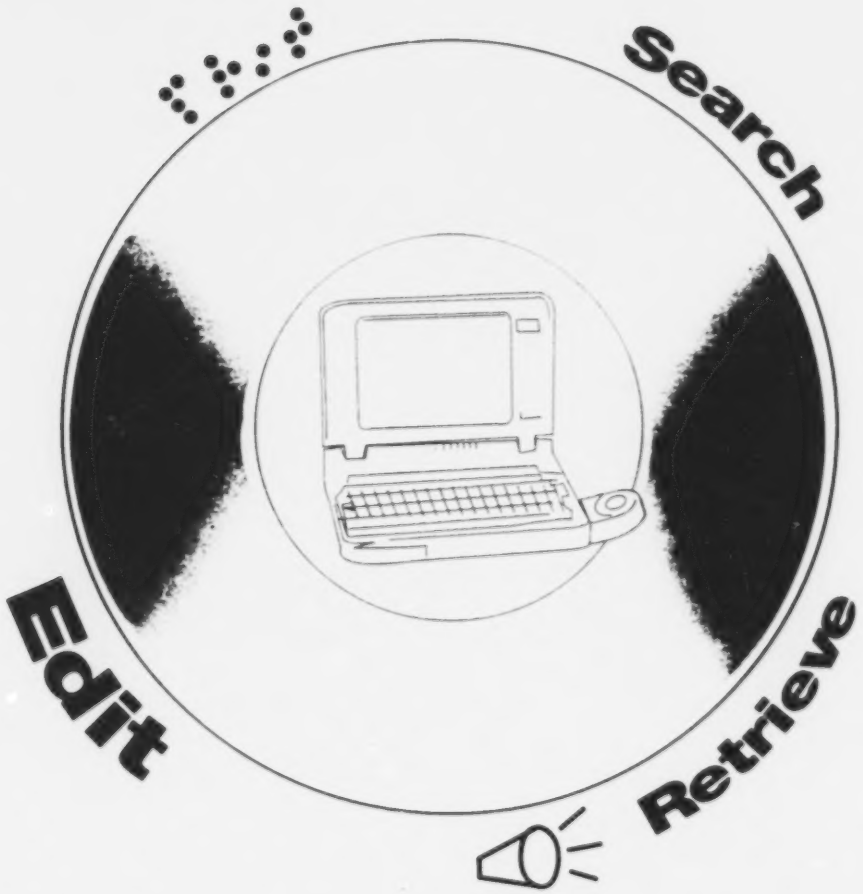
Toni Heinze
Susan Dalton

Research & Development Institute

1996

Project CD-VisROM

Remote Access to CD-ROM by Visually Impaired Students



Gaylen Kapperman
Steve Hahn
Toni Heinze
Susan Dalton

Research & Development Institute

1996

100

Contents

The purpose of this guide is to provide you with an overview of the CD-VisROM system and how it fosters independence for visually impaired students. This guide contains the following information:

- Introduction
- CD-VisROM System Overview
- Reference Materials Available on the CD-VisROM System
- CD-VisROM System Components
- Benefits of the CD-VisROM System for Visually Impaired Students
- Benefits of the CD-VisROM System for Vision Teachers
- Benefits of the CD-VisROM System for School Districts
- How Students Access and Use the CD-VisROM System
- Setting Up a CD-VisROM System in Your Area

Introduction

While students who are visually impaired are right at home in a traditional classroom, they still have obstacles to overcome in order to have equal access to materials. One student summarized these obstacles well:

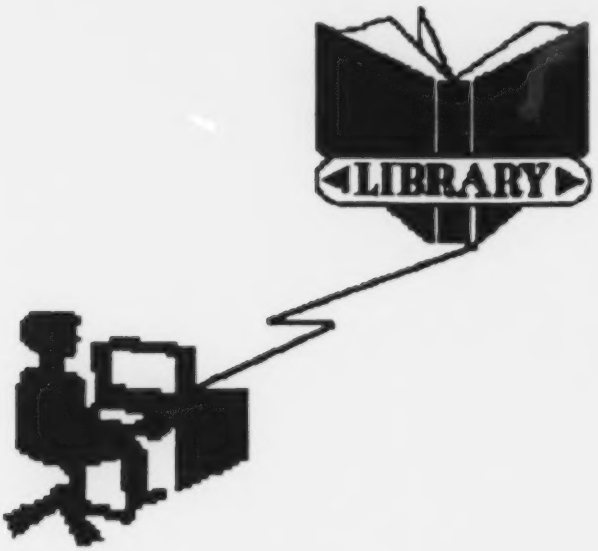
> **"In the past, it's been difficult to gather information from printed sources. I've needed to rely on others to help me. Occasionally, some materials would be available in braille or on audio tape but that was the exception. It was always a pain to find someone to help me read the material."**

The most important materials not readily available to students who are blind or visually impaired are:

- dictionaries
- thesaurus
- encyclopedias
- newspaper articles
- journal articles

Technology is also beginning to have a significant impact on how students learn today. The CD-VisROM system was designed to provide visually impaired students equal access to materials and technology available to sighted students.

> **"I can now find and use materials on my own. My parents don't have to help me either! And the system is available 24 hours a day."**



The CD-VisROM system enables low vision and blind students to use academic reference material independently. Using a laptop computer to access the system, students can use these materials from almost anywhere since the laptop computer is so portable.

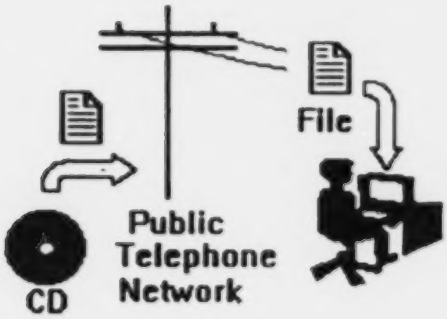
Using the computer's modem, the student dials into the remote CD-VisROM system.

Once connected to the system, the student can perform searches for specific information in the reference material contained on the system.

After locating needed reference material, the student has several options.

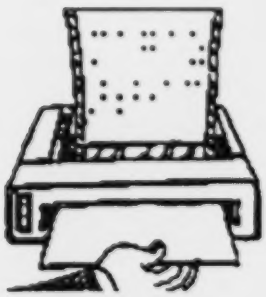
Listen as a speech synthesizer speaks the information on the screen.

View the information in large print on the screen.



Download the file containing the information to his or her computer.

Have an inkprint printer reproduce the information in large print or have a braille printer reproduce the information in braille.



Braille Printer

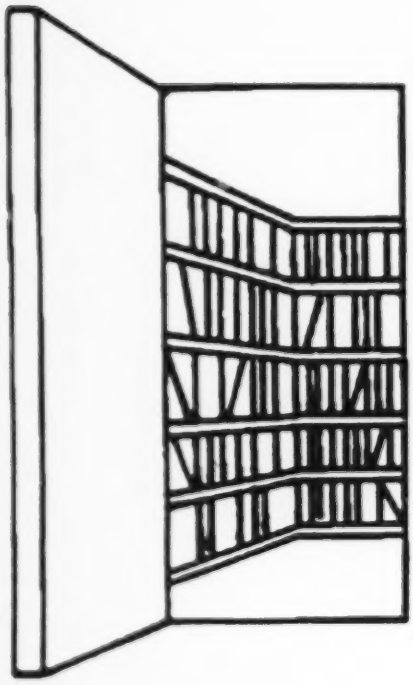
Complete a written assignment using word processing software such as WordPerfect.

Reference Materials Available on CD-VisROM

The organization that develops a CD-ROM system which is remotely accessible to visually impaired persons has the flexibility to choose various types of software for its system. The Project staff chose to use the following:

Main Menu

1. Microsoft Bookshelf
2. Grollier Encyclopedia
3. News Digest
4. Magazine Articles
5. World History
6. U.S. History



Microsoft Bookshelf

American Heritage Dictionary

Roget's Electronic Thesaurus

Columbia Concise Encyclopedia

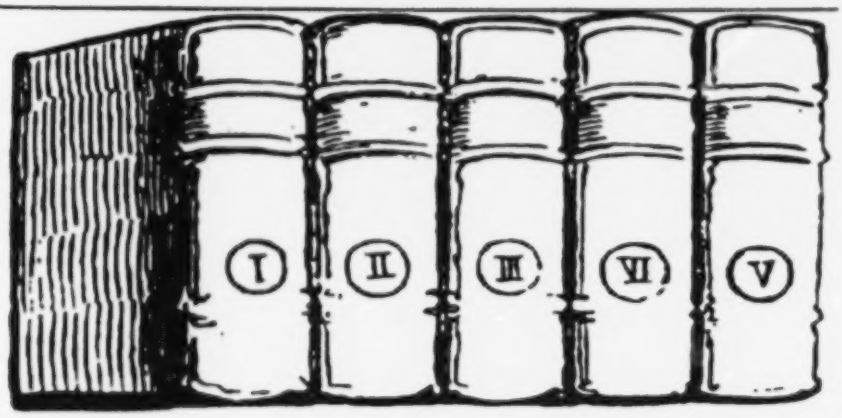
World Almanac

Bartlett's Familiar Quotations

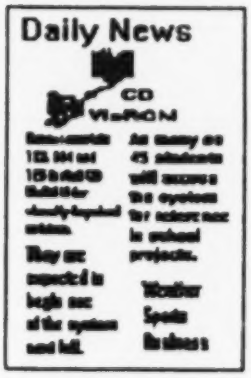
The Concise Columbia Dictionary of Quotations

Microsoft Bookshelf contains the references listed above.

Reference Materials Available on CD-VisROM



Grollier's Encyclopedia includes all 21 volumes of the Academic American Encyclopedia.



News Digest contains full text news articles taken from 75 newspapers and periodicals from around the world.

Magazine Article Summaries Full Text Select contains full text articles from 60 periodicals commonly found in Junior and Senior High Schools, as well as citations from 350 other periodicals.

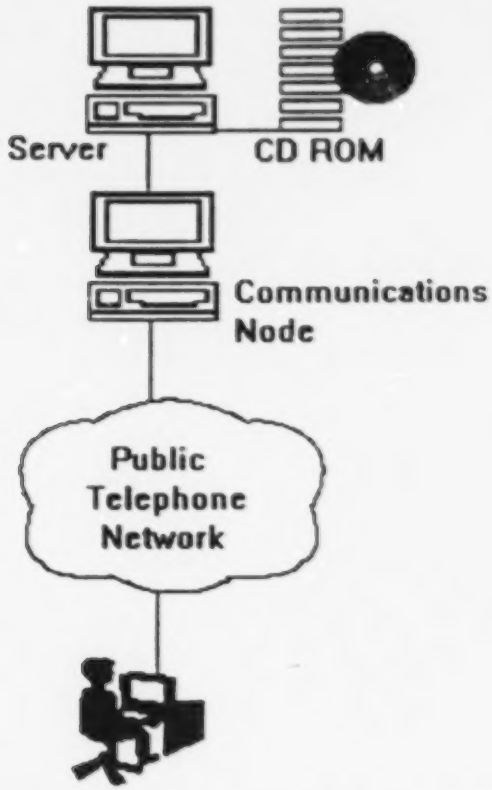
BEST COPY AVAILABLE

History of the World

History of the World contains thousands of pages of primary and secondary sources accessible by title, theme, geographical region, or time period

US. History contains 107 books that include the U.S. Constitution and Bill of Rights, Gettysburg Address, Apollo Moon landings, Nixon Watergate tapes, and Iran Contra hearings.

CD-VisROM System Components

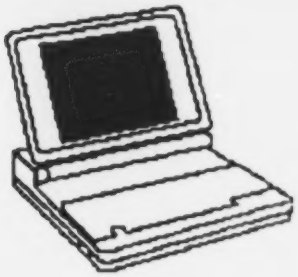


The remote CD-VisROM system consists of:

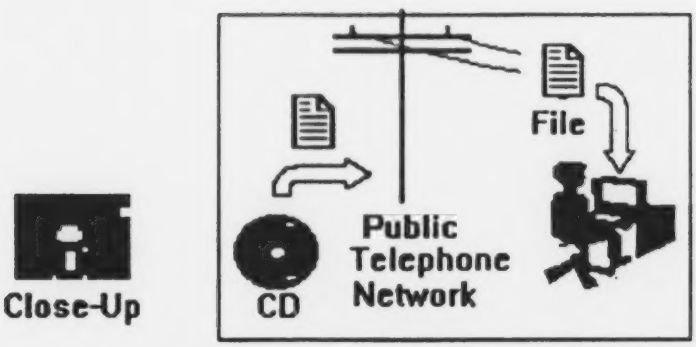
- A communications node and software (computer that allows the student to use the system from a remote location such as home or school)
- A server connected to seven CD-ROM drives
- Reference materials contained in CD-ROM software

CD-VisROM System Components

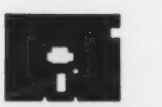
The blind or visually impaired student's system consists of:

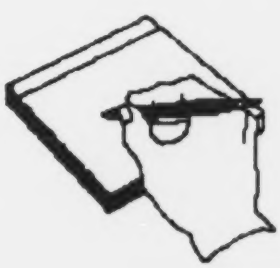


An IBM compatible computer (preferably a laptop computer for greater portability) and modem.



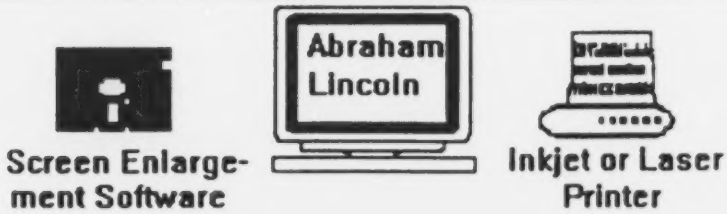
Remote control software, such as Close-Up or PC Anywhere (used to access the information from the CD ROM software and to save that information on the student's computer).



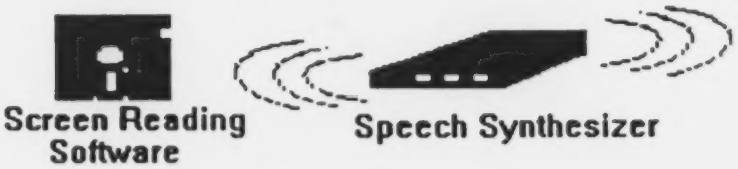


Word processing software.

CD-VisROM System Components

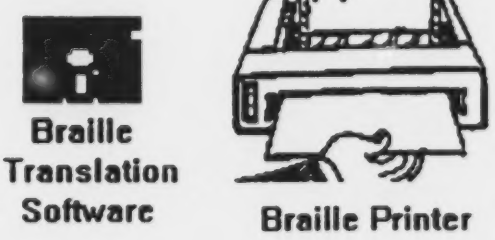


For the low-vision student, screen magnification software such as Zoomtext Plus enlarges the size of the print on the student's computer screen. An inkjet or laser printer is used to print materials in regular or large print.



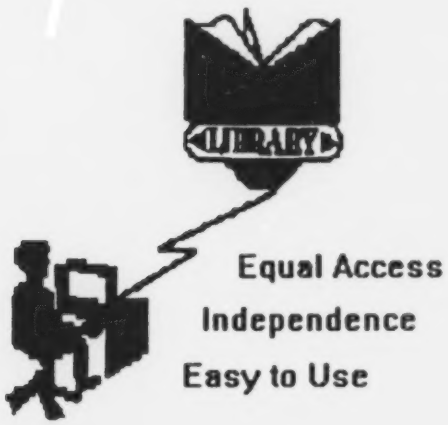
For the blind student, a screen reading program such as Vocal-Eyes together with an external speech synthesizer gives the student the capability of listening to the information presented on the screen.

Braille translation software such as MegaDots converts the information into braille, and a braille printer provides a tactually readable print-out of the material.

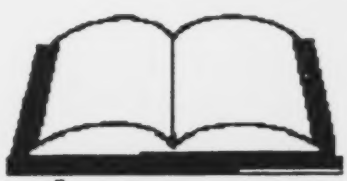


Benefits for Visually Impaired Students

Specific benefits of the CD-VisROM system include:



- Equal access to reference and instructional materials provides more of a level "playing field" with other students.
- Independence in use of reference materials and in completing assignments - no longer is assistance needed from sighted teachers, fellow students or parents. This results in enhancement of self-esteem.
- System is easy to use.
- Convenience - students don't have to arrange for transportation or assistance to use the library's materials to complete assignments requiring research.



Benefits for Visually Impaired Students

- Choice of reading medium - The student can convert the information into a medium which is appropriate for him or her.

  Auditory - using the speech synthesizer

  -or-

  Large Print on the screen - using the screen enlargement software

  -or-

  Large Print in hard copy form - using the inkjet or laser printer

  -or-

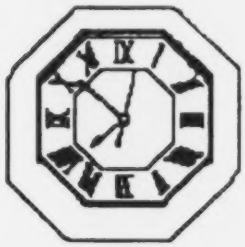
  Braille - using the Braille translation software and a braille printer.

- Current information: software can be updated regularly.

- Portability of the system - using a laptop computer with a modem, a student can access the system from almost anywhere! The only requirement is access to a telephone line.

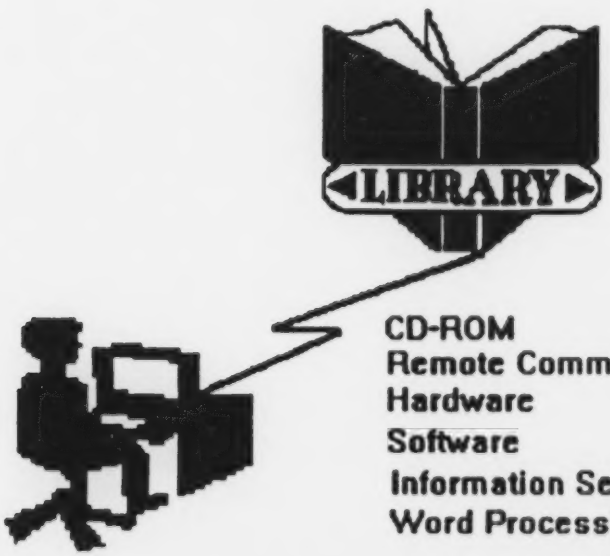
- Independent decision-making - By browsing through materials independently, the student can make decisions regarding what information is important to himself or herself, rather than having others decide for him or her.

Benefits for Visually Impaired Students



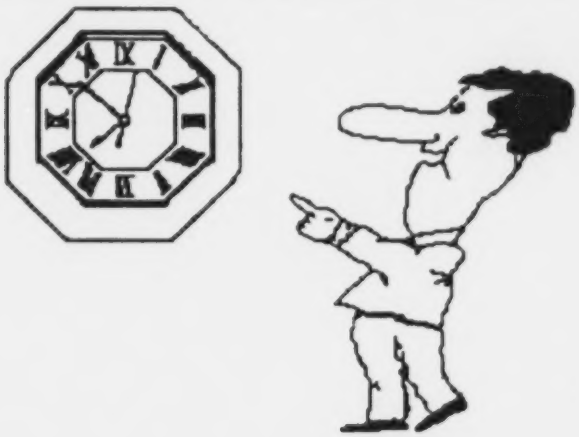
24 Hour Availability

- System availability - 24 hours/day!



- Computer technology skill and knowledge development - New doors of opportunity are opened for the visually impaired student as he or she develops skills and knowledge in the use of computer and information technology.

Benefits for Vision Teachers



For vision teachers, use of the CD-VisROM system by their students makes valuable teaching time available for other instructional activities. Other benefits of using the CD-VisROM system for vision teachers are:

- Less time is spent reading or interpreting material for their students because the students can accomplish this independently by using the large print, braille software or speech synthesizer.
- Less time is spent helping their students find materials.
- The user friendly nature of the system makes it possible for the teachers to train their students to use it in a relatively brief period of time.
- The blind student can hand in assignments directly to the classroom teacher without having these materials transcribed by the vision teacher.

Benefits for School Districts

Cost Effective

- Cost effective: the system is well-suited to be supported by an agency or organization serving many students who are widely dispersed over a large geographic area.

- More effective use of the teacher's time results from independent use of the system by the student.

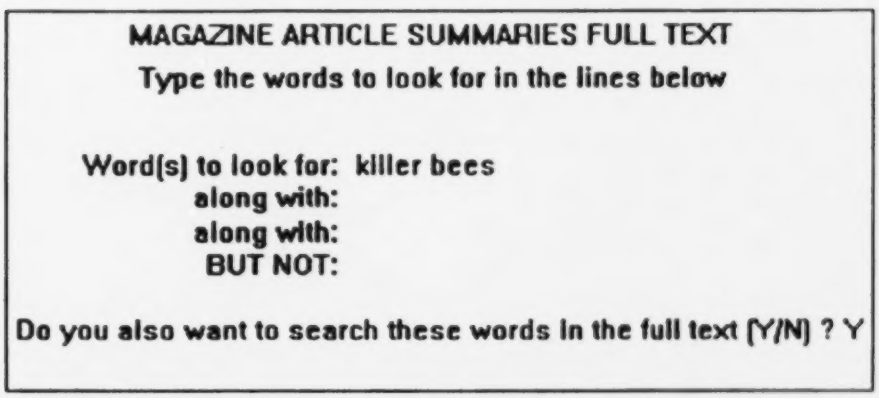
- Visually impaired students have enhanced opportunities for inclusion in the regular classroom.

Accessing & Using CD-VisROM

Using the laptop or desktop computer's internal modem along with the remote control software, the student can dial into the CD-VisROM system from almost anywhere. Any regular telephone line can serve as the communication line to the CD-VisROM system. The student simply follows this procedure:

1. Connect the modem's jack to a telephone wall-socket
2. Using the computer's keyboard, dial the CD-VisROM telephone number
3. Type in a login ID and password

Once logged onto the system, the student can conduct searches for specific content.


MAGAZINE ARTICLE SUMMARIES FULL TEXT
Type the words to look for in the lines below
Word(s) to look for: killer bees
along with:
along with:
BUT NOT:
Do you also want to search these words in the full text (Y/N) ? Y

For example, Matt, a student shown in the videotape is writing a science report on killer bees. After logging onto the CD-VisROM system, he chooses to search for information on killer bees from the Magazine Article Summaries. Matt types in the term "killer bees" on the search screen, then presses the F2 function key to start the search.

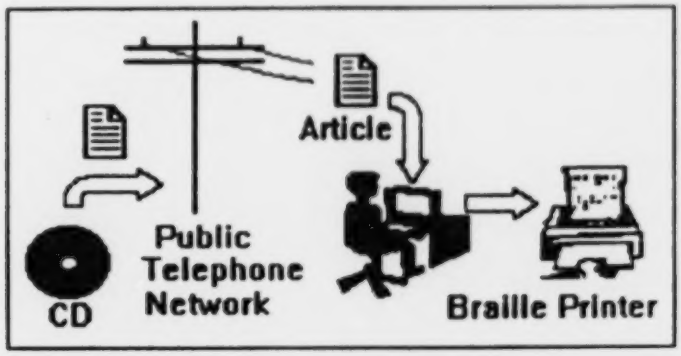
Magazine Articles Summaries Full Text

1. Subject: WORLD Cup Soccer Tournament, 1994
   Title: Dance of the magic feet. By Witteman, Paul A.
   Source: (Time, 7/18/94, Vol. 144 Issue 3, p59, 1p, 2c)
   Full Text Available - Press F7
2. Subject: BEES – South America
   Title: Killer Bees. By Sharp, David
   Source: (Lancet, 7/16/94, Vol. 344, Issue 8916, p187 1/4p)
3. Subject: MEDOC Marathon, 1994
   Title: Grape expectations. By Kardong, Don
   Source: (Runner's World, Jul94, Vol. 29 Issue 7, p80, 6p, 6c)
   Full Text Available - Press F7

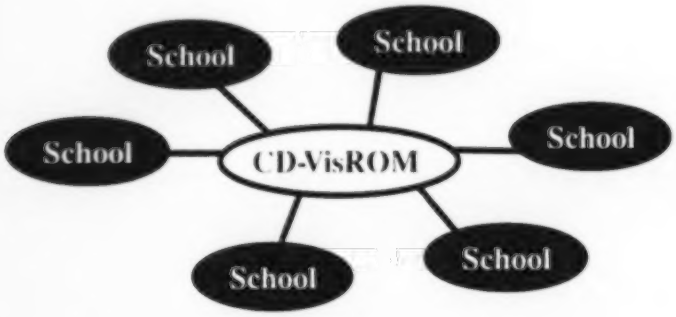
The software indicates that 70 articles were found through the search. Matt decides to read the fourth article listed.

Speech Synthesizer

Matt listens to the article using the speech synthesizer. He then makes the decision whether or not to download the entire article or portions of it to his laptop computer. If he downloads the article he may choose to print it using his braille printer.



Matt downloads the article to his laptop computer. He prints the article on his braille printer and uses the article along with his word processing software to write his report on killer bees.



If you are interested in setting up a CD-VisROM system in your area, or would like additional information, please call or write:

Research and Development Institute
1732 Raintree
Sycamore, IL 60178
(815)895-3078
FAX: (815)895-2448

The production of this tape was supported by a grant from the US Department of Education (Grant No. H180E20053).